THE

WINE AND SPIRIT MERCHANT

LOFTUS, LONDON

5/-

THE

WINE AND SPIRIT MERCHANT.

NEW AND REVISED EDITION.

THE

WINE AND SPIRIT MERCHANT.

A Familiar Treatise

FOR PRACTICAL MEN,

ON THE

MANAGEMENT OF WINES AND SPIRITS

IN ALL THEIR VARIETIES,

WITH AN

APPENDIX,

SHOWING THE SIMPLEST WAY OF GAUGING AND FIXING CASKS AND OTHER VESSELS WITHOUT THE AID OF SPECIAL INSTRUMENTS.

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HYDROMETER, SACCHAROMETER, THERMOMETER AND GAUGING INSTRUMENT MAKER;

Manufacturer of Bottling and Corking Machines, Tools, Bottle Wax, and all Utensils for the Wine, Spirit, and Brewing Trades.

PREFACE.

THIS little work, which is of an entirely *practical* character, has been drawn up with the view of imparting useful and accurate information, in a compact form, to the members of the wholesale and retail wine and spirit trade in all the more important matters of their daily or occasional business. The publisher is not aware that any special treatise of the same kind is at present in circulation, or indeed has ever previously been attempted; and he hopes, in the following pages, to supply a want that is felt by many to be a source of great inconvenience. Whilst Brewers, Maltsters, and most other producers and sellers of articles of general consumption are well provided with manuals of reference, the Wine merchant and the Spirit dealer and retailer appear to have been left hitherto without a guide-book embodying the facts of most service to them in their calling, and suggesting how best to conduct their business on a satisfactory and economical system. Owing to the absence of such a work,

thousands who would be glad to obtain a rational knowledge of the products in which they deal, have no opportunity of gratifying that desire except by resorting to cyclopædias and cumbrous volumes of that class, which hardly ever contain the information they are seeking, and, from the articles being written by theoretical rather than practical men, very frequently confuse and mislead the reader.

All that is herein inserted may be relied on as strictly correct, and as presenting the results of the latest discoveries or improvements in each branch of the subjects. Although the style is studiously popular, scientific exactness has never been sacrificed, and the operative or practical parts are the composition of a person thoroughly intimate with what he professes to teach.

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THE WINE AND SPIRIT MERCHANT.

Chapter First.

DEFINITIONS.

General facts relating to Wine—Its average Composition and Properties, &c.—Amount of Alcohol in Wines—Area of Cultivation of the Grape—List of Wine-producing Countries—Process of Wine making, &c.

THE word "Wine," when used by itself, without any prefix or addition, is generally understood to mean the fermented juice of the grape, or fruit of the vine, in its genuine condition, or at least in the state in which it is procurable from the vineyards or from respectable importers, etc. Sometimes the term "natural wine" is employed in the same sense, when we wish to signify that a particular wine is *entirely* free from artificial colouring or admixture with spirit, sugar, or other materials. Any beverage possessing certain of the properties of fermented grape-juice, but derived in whole or in part from different sources, if called a "wine," has, or should have, a descriptive title prefixed; thus, Currant

Wine, Ginger Wine, and all the family of British Wines or Sweets. Cider and Perry may be regarded as coming under the same designation; they are indeed occasionally referred to as Apple Wine and Pear Wine, respectively. Various medicinal preparations also in which wine of some kind forms the bulk of the liquid receive the name of wines, as for instance, Antimonial Wine, Quinine Wine, &c., &c., the wine in these cases serving merely as a vehicle for the convenient administration of the drug.

In this present short work, Foreign Wine will be the only kind treated of. For instructions in the making and management of British and all other artificial wines, reference must be had to special treatises.

Composition and qualities of Wine.—All *genuine* wines have certain points in common as regards their composition and properties. They consist necessarily of little else than the elements of the grape juice, modified and transformed by the process of fermentation; but the changes thus brought about are very complex, alcohol or spirit being only one, although the principal of the new bodies produced out of the original materials. Grape juice itself varies greatly in composition, according to soil, climate and method of cultivation. On the average, however, fresh ripe grapes may be viewed as containing in every hundred parts by weight, eighty parts water; thirteen parts sugar (glucose); three parts gum; two parts woody matter, and the remaining two parts, acids, ethers and salts. Wine or grape juice after fermentation, contains of course, water as its chief (most bulky) ingredient, then, alcohol in varying proportions, together with carbonic acid gas, sugar in two forms, as altered and as

unaltered respectively by fermentation; the original acids of the juice, both free and in combination with alkalies (mineral matter); acetic acid; small quantities of so-called "ethers," some ready formed in the grape itself, and others developed during fermentation by the action of the spirit on some of the acids present; volatile oils; glycerine; mineral matter derived from the soil in which the grape was planted; colouring matter imparted chiefly by the husk or skin of the grape; tannin, an astringent substance most abundant in red or highly-coloured wines; and a number of other bodies known to chemists, but all in very minute proportions, however essential to the flavour and characteristic properties of the wine in which they occur.

It is principally to the acids, volatile oils and ethers present that each variety of wine owes its peculiar taste and *bouquet* or perfume. The spirit confers the strength or intoxicating quality; the sugar and extractive matter give fulness; tannin lends roughness or astringency, and thus the natural wine is made up. No two wines, the product of different varieties of grapes, agree in the amount of their several constituents. In one kind acids or acid salts predominate; in another, sugar or the saccharine element; in a third, the chief characteristic is the roughness or astringency, and so on. Even the same grape when cultivated on a different soil, or when exposed to longer or hotter sun- shine, and other natural influences, furnishes a wine in many respects unlike the product originally obtained from it. So important, indeed, is the influence of soil and climate, that the vine when transplanted to another not very distant country, frequently

yields a grape, the wine made from which has hardly anything in common with the produce of that vine when growing in its native soil. The species of vine cultivated generally in Burgundy, for instance, if reared in Spain will furnish a wine (Sherry) wholly different in character from any of the products yielded in Burgundy itself, and yet the distance between the two places may not exceed a few hundred miles. Again, Italy and Greece, almost adjoining countries, in which the vines grown are of the same original stock (Grecian), produce wines of widely different character.

Another circumstance greatly tending to modify the qualities of wine in general is the mode of treatment of the same juice in the manufacture and fermentation of the materials. *Glucose*, which is the name given to the kind of sugar present in grape juice (and in sweet juices generally), forms the largest solid ingredient of the juice. There are also, as has just been stated, vegetable acids, chiefly tartaric, the greater part combined with potash (cream of tartar); while in the seeds and skin reside tannin; some bitter principles; flavouring matter; albumen, etc. The kind of wine produced therefore, its ordinary flavour, etc., must in a large degree depend on the including or the leaving out, wholly or partially, of these characteristic ingredients in the operation of wine making, a matter which lies under the control of the manufacturer. If the grapes are used before they are ripe, less sugar will be present, and less alcohol formed; acids or acid salts will predominate and give the distinguishing flavour and odour to the wine. The same effect will be produced in a great degree where the vines

when growing receive too little hot sunshine to develop the full amount of sugar which the grape is capable of yielding. As a rule, with new wines of an acid character, the bouquet or volatile odorous principle is strongly marked. Sugary or full-bodied wines also when old become sensibly aromatic, and proportionately valuable from the long continued interaction of the spirit and the essential oils or ethers present.

Fermentation.—The first and most observable effect of fermentation in grape juice is the production of spirit and the disappearance at the same time of part of the sugar, as indicated by the altered taste. So much spirit generated represents always a certain portion of sugar gone, as such, from the liquid. But there are also several other changes in the fermentation of grape juice, and in the gradual ripening of the wine that results. Much of the acid tartrate of potash, at first dissolved in the *must* (fresh grape juice) is deposited slowly as the wine ripens or becomes fully formed; this happens because the salt in question—cream of tartar—cannot from its nature remain in solution where there is any considerable amount of spirit present, and the generation of additional spirit goes on almost indefinitely, although on the small scale, in wine, when it is allowed to attain any age. The tartrate thus deposited usually clings to the sides of the vat or bottle, and when collected forms the so-called *argol*, or crude cream of tartar of commerce. In the stronger kinds of natural white wines minute floating crystals may be seen; these consist of nearly pure cream of tartar. An acid quite distinct from the acid naturally contained in the grape juice, acetic acid (vinegar) is developed to a small

extent during fermentation, and increases in quantity as the wine is kept; the weaker the wine the more subject is it to the formation of acetic acid. It is this acid that constitutes the *sourness* of old thin wines; it is always formed at the expense of some of the spirit previously generated. Some other peculiarities of fermentation and the differences in flavour and quality thereby produced will be noticed in the chapters devoted to the wines of various countries and districts.

Alcohol in Wine.—With regard to the important question of the amount of alcohol * present in *natural*, or but slightly fortified wines, when ready for consumption, it will be sufficient to state here generally, that Clarets, Hocks, and other light wines of that character seldom contain less than nine or more than fourteen per cent. *by measure* of alcohol, (16 to 25 per cent. of proof spirit); Sherries from 16 to 23 per cent. alcohol (29 to 41 per cent. of proof spirit); Madeira from 21 to 23 per cent. alcohol (37 to 41 per cent. of proof spirit); Port from 13 to 24 per cent. alcohol (23 to 43 per cent. of proof spirit; Champagne, on the average 11 per cent. alcohol (19 per cent. of proof spirit). The proportions in other less known wines will be found in the Table, page 176.

As wine contains several other ingredients besides spirit and water, its strength (richness in alcohol) cannot be ascertained by the simple application of the Hydrometer, as in the case of Whiskey, Brandy, etc., where there is hardly any matter present except spirit and water. The only practicable method of testing the strength of wine is to distil a measured quantity—a pint,

* See Note on the alcoholic strength of wines, and Table, page 194.

a gallon, etc.,—by means of a suitable apparatus, and then after having brought the weak spirit distilled over by the addition of water to the same bulk as that of the wine operated on, to try the strength with a small Hydrometer or with a specific gravity bottle and a fine balance. No more simple and ready method giving accurate results, has yet been discovered. A wine merchant trading on anything like a large scale should provide himself with a small metal still, or retort and condenser, and the other necessaries just described, and learn how to use them, in order that he may check the Customs account of duty and test the strength of his wines at anytime for purposes of blending, racking, etc. It is not at all difficult to acquire the process of distilling a sample of wine. A few experiments will render any careful person expert at it, without a knowledge of chemistry, and give him a most desirable command over an important part of his business. Customs and Excise officers of no special training distil hundreds of samples every month. The publisher of this work will be happy to furnish on application an estimate of the cost of the requisite instruments.

Area of Cultivation of the Grape.—It is found that the grape will not ripen well naturally so as to yield fruit fit for wine making, except in places which lie between certain degrees of latitude north and south of the equator, and where at the same time a certain *maximum* summer heat is reached. Extremes of heat and cold appear to be equally unfavourable to its successful cultivation. For this reason, grapes when grown in the open air, will not come to maturity in the British isles,

no part of which is situate within the requisite geographical limits, or attains a sufficiently great summer heat, although the *average* temperature of the year is very high. But in countries that command this degree of heat without being tropical, grapes ripen in the open air irrespective of position on the earth's surface. There are many localities the average yearly temperature of which is far below that of England, and which yet produce good wine, because in summer the heat rises for a time to the necessary height. Roughly stated, the culture of the vine for wine-making purposes is confined practically to a belt lying between the latitudes 25° and 50° north of the equator, and to a belt of nearly equal extent between latitudes 25° and 50° south of the equator. Thus, the tropical and polar zones are with slight exceptions excluded, the one as being too hot, and the other as being too cold, but the exact limits of possible vine culture, especially as regards the region south of the equator, are not known at present. Peru, in the extremity of South America, Southern Africa, and Australia, all lying in rather low latitudes produce useful wines, and no doubt with increased knowledge and care the vine will yet be caused to flourish in climates not now included in the area of wine-making countries. It may be cited as a remarkable fact, that in regions south of the equatorial limits as above defined, the vine where planted, tends to become an evergreen, in which there is no longer any difference in the several stages of growth and thus the plant is unable to mature its fruit in the same manner, and to the same degree as it would do if subject to the ordinary rotation of the seasons.

List of Wine-producing countries.—The various countries in which wines of a merchantable character are at present produced, and which export in any quantity to this kingdom, are below enumerated, together with the names of the *principal* wines for which each district is famous.

FRANCE.—Wines of the Bourgogne or Burgundy district, together with Mâconnais and Beaujolais (Beaune, Pommard, Maçon, Chablis, etc.); wines of the Gironde or of Bordeaux (Claret)—wines of the Loire and Rhone valleys (Saumur, etc.),—wines of the Champagne district.

GERMANY, AUSTRIA, HUNGARY.—Rhine and Moselle wines or Hocks—wines of Alsatia—wines of the Tyrol, Styria, Dalmatia and Croatia—Carlowitz, Erlan; the rest but little consumed out of the localities in which grown.

SPAIN.—Wines of the Xeres district (Sherry), San Lucar, Manzanilla and Kota—wines of Catalonia, (Catalan), Arragon and Valencia.

PORTUGAL.—Wines of the Alto Douro (Port), Consumo —wines of Lisbon and Bucellas.

ITALY.—Wines of Piedmont (Asti, Chaumont, etc.),—Wines of Tuscany (Monte Pulciano, Muscat, Chianti), Sicilian wines (Marsala).

SWITZERLAND.—Wine of the Grisons (Chiavenna); Erlach, Valtellina.

GREECE.—Santorin, etc., wines of Cyprus (Commandery, etc.)

ATLANTIC ISLANDS.—Madeira, Canary, wines of the Azores, etc.

AFRICA.—South African wines (Cape, Constantia), wines of the North of Africa (little known).

AMERICA.—Catawba, Scuppernong, etc.

AUSTRALIA.—Auldana, etc.

Process of Wine-making.—Only a brief, general sketch under this head can be given in the present work. There is much variety in the modes of manufacture and subsequent treatment, but the principal facts are as follows :—

The vines are planted in rows from five to six feet apart, and trained either on upright poles or trellises. For the first two or three years after planting, the young vine is pruned very low, and but few "eyes" left; this is done on the general principle of ensuring the vigorous growth and fruit-bearing quality of the surviving shoots. As a rule, the vine does not bear serviceable fruit until it is three years old. As soon as the vines begin to bear fruit they are trained round the trellise in the shape of a hoop so as to favour an equal distribution of sap. After the ripe grapes have been picked, and at the approach of winter, the props or trellises are removed, and the vines after careful trimming are laid upon the ground and covered with earth as a protection against snow and frost. The end of September or beginning of October is generally, and in favourable seasons, the time for commencing the vintage, but all depends on the ripeness of the fruit. It is considered that the grapes are fit to be gathered when those of the red or bluish kind become dark purple or nearly black, and the white kind of a brownish yellow colour. The grapes in clusters are pulled by hand, or now more generally cut with scissors or knives from the vines. So much depends on the dryness of the fruit that gathering is never begun before the sun has dispelled the morning dew. In some districts

the choicest and ripest bunches are first gathered and every damaged or imperfect grape removed, so that the wine may receive no taint; a second gathering then takes place, a selection being made of the next best grapes for addition to the first pulling. On a third and last gathering the fruit obtained is used by itself for conversion into a wine of low quality.

It is considered essential that the produce of the gathering should be pressed the same day. In France, the country where the art of wine-making is best understood, it is usual as the grapes are gathered to throw them into a perforated tub placed over a large vat, where they are either trodden out by men wearing wooden shoes, or crushed in vessels by means of large pieces of wood, or between cylinders revolving in opposite directions. With the first method, uncleanly as it seems, less risk is incurred of bruising the pips or stalks, and thus imparting a bitter, unpleasant flavour to the wine. When a sufficient quantity of juice is obtained, the whole of it, including the stalks, skins and seeds, is conveyed to the wine press, where the work of pressing and straining out the liquid juice by itself is proceeded with as quickly as possible. Blue and purple grapes are usually removed from the stalks before being pressed, white grapes are pressed with the stalks. The first rude crushing is of great service as it reduces the resistance of the grapes in the press. All grapes, however, are not thus treated, and in making white wine it is never done, as it extracts the colouring matter of the skins.

The bottom of the press upon which the grapes are placed is made with a slope, and when the pressure is

applied—which at first must be very gentle to prevent over-flowing—the juice, without any portion of skins or stalks, runs down and passes through several holes in the front of the press into a vat placed beneath, from which it is conveyed to the cellar.

After the press has been screwed up for several hours it is relaxed, and as its action has been more on the centre than at the sides, the edges are cut round, and after being broken up, replaced, The screw is then again applied, and the wine produced, which is of inferior quality, is termed wine of the second pressing.

Little juice now remains, but the press is loosened to permit of the "murk" or solid residue being cut into small pieces, when it is again worked, and the liquid flowing from it made into wine for the use of the labourers.

It is not usual to leave the stalks for any length of time in contact with the grape juice; it is only where the wine produced is of the kind that tends to become thick or ropy that the presence of the stalks is found useful. In separating the stalks from the grapes several methods are employed. One plan is to turn a long wooden fork round and round in a vessel filled with the fruit, by which means the stalks get detached, and are brought to the surface and removed; another practice is to whirl the grapes round in a double cage made of parallel wires, when the grapes alone drop through the wires leaving the stalks in the cage. Hurdles are also used, a movement being given to them which allows the fruit only to pass through the meshes.

It should be stated, that in the making of *red* wines it is necessary to keep the crushed grapes in a vat loosely

covered over for a period varying from three or four days to a month, until it can be seen by examination of a sample that the "must" has acquired the requisite depth of colour from contact with the skins. Shortly after a quantity of juice has been obtained from the crushed and pressed grapes, a perceptible rise in the temperature of the liquid or so-called "must" takes place, and the process of fermentation begins of itself—that is without the addition of any extraneous ferment being necessary, as in the case of beer making, where yeast or barm must be employed to excite fermentation. Grapes, in common with most other fruits, contain their own peculiar ferment, or the materials of such ferment, side by side with, but in the *whole* fruit separate from the sweet juices in their interior. When the grapes are crushed, this ferment is liberated and thus enabled to act on the sugar of the juice, producing the action called fermentation.

The vats or casks in which fermentation is carried on are generally constructed of wood—although many stone vats are to be found in various parts of the Continent—and it is an important duty to see that these are particularly clean and in readiness for use before the commencement of the vintage. Wooden vats or casks when new are steeped in hot and cold water, salt water, decoctions of plants, &c., to prevent the wood imparting any disagreeable flavour to the wine.

Vinous fermentation begins in a few hours, and is most successfully conducted at a temperature of from 60° to 70° Fahrenheit. In warm climates the vats are made large, and then the fermentation is more active, a fact which favours the production of a stronger wine; but the

operation of filling large vats is considered too hazardous in cold countries, and is therefore not frequently adopted.

The time necessary for complete fermentation depends on the ripeness and quality of the grapes, the soil, season, and other circumstances. In some parts of France the "*must*" remains under fermentation from ten to forty hours only; in other parts it requires a greater number of days; in Portugal seventy-two hours, and in Spain double that number is about the time allowed; but the greatest experience is necessary to acquire a knowledge of the time when fermentation is, at this stage of the operation, perfect, and the wine fit to be drawn off.

The wine is conveyed from the vat into barrels made of oak or beech wood, and every precaution taken to have these casks or barrels perfectly free from tartar and other impurities. Old casks are washed in hot "*must*" after having had the tartar removed, which is sometimes effected by putting two heavy chains and a little water in the cask, and rolling it violently up and down so that the chains strike every part of the interior. After the casks have been rinsed and thoroughly dried, a lighted sulphur match is placed inside and allowed to burn, but this practice requires great care as in the event of the cask not being dry a taste of sulphur is sure to be imparted to the wine.

Fermentation again takes place, but in a much more gentle or gradual form, on the wine being barrelled and before it is racked. During this process, bitartrate of potash is deposited on the sides of the cask, and worn out ferment (wine yeast) at the bottom. The casks are only filled to within a few inches of the bung, to allow space

for the carbonic gas which further disengages itself at this stage. This gas fills up the vacuity and is let off above the surface of the wine by means of a hole in which is inserted a wooden peg. Rhine wine is thus left to ferment for several weeks, during which time it is frequently roused so that the fermentation may be uniform throughout.

When the fermentation finally ceases, the casks are filled up and carefully closed to exclude the air, which, if admitted, invariably produces mouldiness on the surface of the wine and unfits it for consumption. It is important that the wine should ferment thoroughly in the casks at autumn, otherwise it will not ripen nearly so fast—fermentation frequently recommencing in June when the vine puts forth its buds.

Fermentation is conducted in different countries at different temperatures, giving rise of course to different results. Must, fermented at from 60° to 68° Fah. yields a wine strong in alcohol, but deficient in *bouquet;* whereas if the fermentation be carried on at from 41° to 59° Fah., the product will be a wine rich in bouquet but poor in alcohol. The wines of Spain, the South of France, Austria, and Hungary are produced at the higher temperatures, and the wines of Germany, usually, at the lower heats.

Racking is the separation of the wine from the lees and thick wine, and is in most countries indispensably necessary. Rhine wine is not racked until the spring, and a second racking takes place a few weeks after the first. It is then again racked every autumn and spring for three or four years until it is ready for bottling.

Some wines are allowed to remain on the lees several

years. Climate and soil have, however, such an influence on the wines of some countries, particularly those of France, that unless racking were resorted to they would be unfit for drinking.

Many plans are adopted in racking wine; but the principal considerations are to avoid its being disturbed, and to exclude external air. When, from the fineness of the lees, the wine cannot be thoroughly disengaged from them, recourse is had to finings formed of whites of eggs, &c. Spanish earth is generally used for Sherries, and has the effect of adding to their brilliancy. Chalk is used to counteract the acidity of some wines, and cream of tartar when wine becomes oily.

All the preceding statements and explanations must be considered as applicable only in part to the manufacture of Champagne and similar effervescent wines. A full account of the details of preparation will be found in Chapter 2, part 2.

The cares of dressing the vine and gathering its produce are not all that the wine-grower has to occupy himself with, for the produce of the grape is liable to so many accidents that he is compelled to resort not only to the blending of different vintages, but also to the finding of remedies for oiliness, acidity, bitterness, &c., blemishes which he cannot prevent, and which generally occur when the vintage is poor in quantity as well as quality.

Chapter Second.

Part I.

WINES OF FRANCE.—CLARET—BURGUNDY—CHAMPAGNE, &c.

Culture of the Vine as a Branch of Industry—Excellence of French Wines—Consumption in England prior to 1693—Methuen Treaty—Altered Taste of Wine Consumers—Increased Consumption of French Wines after Equalization of Duties—Lowering of Duty and its effect on Consumption—Lessened demand of late years for Clarets and other light Wines—Probable Causes—Value of Clarets as a Beverage—General facts relative to Claret, Burgundy, Champagne and other French Wines.

The culture of the vine is one of the most important industries carried on in France. From her fertile soil and warm favourable climate, joined with the skill and science applied to the art of wine making, France may be termed the "earth's vineyard." Her Champagne, Bordeaux (Claret) and Burgundy have no equals elsewhere, while most other French wines are little inferior in all essential vinous qualities to the best productions of the vine growing countries around her.

From a remote period the wines of France formed the great proportion of the consumption of England, and in

the reign of Charles II., when the duties were almost nominal, one half at least of the quantity consumed was of French origin—Bordeaux, Burgundy, and Hermitage being preferred to the light wines of Spain; but in 1693 French wines were taxed 25 per cent. more than those of Spain and Portugal. In 1697 to 1707 this differential rate amounted to 142 per cent., and from that time to the equalization of the duties in 1831, was never less than 50 per cent.

Port wine was little known in England previous to 1693, but as the red wines of Bordeaux became excluded by increased and unfair taxation, Port took its place. In 1703 the Methuen Treaty was entered into with Portugal, by which French wines were to be taxed 33⅓ per cent. more than those of Portugal, and of this treaty Mr. Hume, in his "Essay on the Balance of Trade," published in 1752, says:—"We lost the French market for our manufacturers, and transferred the commerce of wine to Spain and Portugal, where we buy much worse liquor at a much higher price."

In was, however, a considerable time after the treaty before public taste could be brought to conform itself to the exigencies of legislation, and but for the frequent wars between England and France, the wines of the latter country would have been more successful in the struggle; but as political differences extended, the desire for the mutual oppression of each other's industry increased, and greatly assisted in altering the people's taste.

For sixteen years previous to 1830, the proportion of French wines consumed in England was only 4·42 per cent. of the total consumption of foreign wines in this

country, but in 1831 the differential duty in favour of port was discontinued, and an increased quantity of French wine was drunk. In McCulloch's Commercial Dictionary the effect of the Methuen Treaty is thus described:—"It is the most striking example, perhaps, in the history of commerce, of the influence of Customs duties in diverting trade into new channels, and altering the taste of a people. All but the most opulent classes have been compelled for a long series of years either to renounce wine, or to use Port, and so the taste for the latter has been firmly rooted—that which was originally forced upon us by necessity having become congenial from habit. It is probable, however, now that the discriminating duty in favour of Port is abolished, that the excellence of French wines will regain for them some portion of that favour in the English market they formerly enjoyed."

The validity of this conclusion must be admitted, as during a period of twenty years, from the equalization of duty, the consumption of French wines increased 50 per cent., but still the preference for strong wines lingered with the upper classes, and the cheap light wines of France found little, if any, market in England, as the duty was still too high for the middle and lower orders to become consumers.

In 1851 a Committee of the House of Commons was appointed to consider the question of a reduction of the duties on all wines, but dissolved without agreeing to a report. The agitation, however, out of doors was continued, and in February, 1860, the duty on every description of wine was made 3s. per gallon; in 1861

and 1862 further alterations took place, doing away with the fixed rate and charging the duty in accordance with the degrees of proof spirit—ascertained by Sykes's hydrometer—contained in such wine. All under 26° proof spirit, at 1s. per gallon; above 26° and under 42°, 2s. 6d. per gallon, with an additional duty of 3d. per gallon for every degree above 42°.

These alterations were greatly in favour of the light wines of France, and in 1861 an increased consumption of 1,102,063 gallons over the previous year took place, although the consumption of 1860 had exceeded that of 1859—when the duty was 5s. 6d.—by upwards of 400,000 gallons.

The consumption in recent years has not, however, kept pace with that of 1861. Between the years 1873 and 1884, there has, with the exclusion of two years, 1876 and 1880, been an annual decrease amounting in the average to a quarter of a million gallons. In the seasons above mentioned, 1876 and 1880, the produce was exceptionally large and good, allowance must, of course, be made for bad vintages; but it is not too much to say that the consumption of light French wines in England is now almost sta ionary. Into the causes of this falling off or slackness of demand for wines of the Claret or Burgundy class, it is not possible in the present work to enter at any length. No doubt, considerable influence is exercised among the middle classes by the temperance or total abstinence movement, and the preaching of doctors against stimulants. But the long continued depression of trade and commerce, leading to a stricter and stricter economy in

the purchase of anything but the actual necessaries of life, is probably the chief reason of the lessened consumption of Claret and light wines generally. It might be thought that some portion of the falling off, as regards at least the higher kinds of Clarets, etc., is perhaps attributable to a sudden return on the part of the public to the old-fashioned liking for Port. This will be noticed more particularly in the chapter on that wine. But as a rule Port drinkers are not to any extent Claret drinkers, so the matter admits of hardly any explanation in this way. With better times will come no doubt a revival of demand in the direction of Claret. Plenty of sound palatable wine is to be had from importers and dealers, and at exceedingly low prices; all that is wanted is the customers. As a question of health only, it is most important that a general taste should be acquired for light wine to be drunk at meals, a tumblerful of Claret or Hock and water is one of the most wholesome and refreshing beverages one can take at dinner, lunch, or supper. Beer only suits particular persons, those who have much open air occupation or exercise; spirit is not adapted for a regular beverage; but sound light wine mixed with water suits almost everybody.

GENERAL FACTS RELATING TO CLARET, BURGUNDY, CHAMPAGNE &C.

The name "Claret" which is given in England—but nowhere else—to every kind and quality of Bordeaux wine, is of uncertain derivation. It is said by some to mean simply a "clear red dark colour?" By others, wine of this character is said to have been called Claret,

because of its resembling or actually being in part the produce of the Clairette grape. By others the origin of the word is referred to CLAIRE, a beverage once prepared at Bordeaux and in the adjoining districts. In France and on the Continent generally, wine of the nature of Claret is termed Bordeaux. Good Claret—a cheap sound wine answers this description as well as the finer and dearer sorts—is distinguished from most other light wines of the same character, by its *thinness* or want of body as compared, for instance, with the general run of Burgundy wine; the delicacy of its aroma; its property of bearing a considerable addition of water, without impairment of flavour; its freedom from excess of acid, and its refreshing, vivifying effects on the system. Claret, or Hock, is the special wine for consumption with food; no wines are so well fermented and so carefully prepared as the Bordeaux wines. It is characteristic of Claret that for the purposes of the ordinary consumer—a person not a connoisseur or skilled wine fancier—there are really but two important classes of the wine, viz., the sound common kind, suitable for mixing with water and serving as a beverage at meals, and the choice growths at a high price used chiefly as after-dinner wines. The numerous intermediate qualities are in little demand, at least in this country, and are what may be termed "fancy brands," profitable to the importer or dealer where the sale can be pushed.

Claret not being an "alcoholic" wine—20 per cent. proof spirit at the highest—, and containing in itself hardly any saccharine to engender gradually more spirit than results from the first fermentation—requires very careful treatment both in cask and bottle. It is perhaps of all

wines the one most susceptible of injury to the condition and flavour from ill-regulated temperatures.

BURGUNDY in all its varieties, has more stoutness or "robustness," as it may be termed, than Claret. It is pre-eminently a full-bodied wine, but its body or fulness proceeds from aroma rather than alcohol. It is usually rougher on the palate, except in the finer and older kinds, than Claret. The alcoholic strength is about the same. It does not mix so well with water for a beverage as Bordeaux wine, and if not well matured is very apt to cause indigestion and other discomforts, when drunk at all freely. It is often said to be a "gouty" wine, but there seems little basis for this statement. In the Burgundy districts where the coarsest form of the wine is consumed by the peasants, gout is by no means prevalent. In cases of debility and nervous exhaustion, sound Burgundy is of special value, a fact fully recognised by the medical profession now-a-days. The great difference between Claret and Burgundy is, that a poor, low-class, Burgundy is scarcely drinkable, whereas very cheap genuine Claret forms an excellent beverage. Burgundy, again, is richer in earthy salts, than Claret, and for this reason must be taken with more caution and respect for individual peculiarities. Burgundy requires quite as much care in its management as Claret.

CHAMPAGNE.—The only facts of importance that can be noted in a brief general way respecting this wine, are that hardly any of it is drunk in its natural state, elaborate preparation being needed to adapt the fermented grape juice to the public taste; syrup has to be added after bottling in order to impart the desired sweetness,

and gas injected to render the wine sufficiently effervescing when poured out. More or less syrup constitutes in fact the difference between sweet and dry Champagne. Some varieties of the grape yield, it is true, a naturally dry tasting wine, and this is of course the only true dryness, but in the great majority of cases the skilful addition of syrup and spirit must take place before the wine is ready for the market. Champagne, when genuine, is recommended by doctors for its property of sustaining a system in periods of exhaustion, and for tranquilizing the sick stomach. The large amount of carbonic acid gas present tends to carry off the effect of the spirit, and stimulates without subsequent depression. In point of alcoholic strength, Champagne ranks lower than Claret or Burgundy, except where spirit has been largely added to an inferior wine, to preserve its condition and give it apparent dryness of flavour.

Further particulars respecting Champagne and other French wines will be found in the second part of this chapter.

Chapter Second.

Part II.

WINES OF FRANCE (*continued*).

Division of the Wine Departments of France into Six Principal Districts—Southern — South Eastern—Eastern — Central—Western and South Western—Description of Wines produced in each District—Manufacture of Champagne—Wine freezing, etc.

Wine Districts of France.—The principal wine-producing districts of France, are the ancient provinces of Auvergne, Burgundy, Champagne, Dauphine, Gascony, Guienne, Languedoc, Lyonnais, Provence and Roussillon. Perhaps the finest and best known of all the French wines, numbering more than 1,500 varieties, are those yielded by vines grown in the valley of the Gironde (the country round about Bordeaux) :—such as Médoc, St. Emilion, St. Estephe, St. Julien, etc., etc., Médoc being the principal. As a rule the name of each of the best wines is derived from the vineyard or estate in which the vines are grown, thus, Chateâu Lafitte, Chateâux Margaux, etc. A particular account of all the districts and wines will now be given. France is divided into eighty-nine departments (inclusive of Savoy and Nice). In upwards of seventy of these departments the cultivation of the vine is carried on, but it is unnecessary to give a

separate account of each department in particular order, as some few produce wine of so common a kind that the British merchant or wine consumer can have but little interest in the subject. We shall follow the plan adopted by M. Victor Rendu, Inspector-General of Agriculture, &c., who, in his celebrated work on wines, divides France into six principal districts, viz.: 1st, the Southern, including the eight following departments:—Corsica, Pyrénées Orientales, Aude, Herault, Gard, Bouches de Rhône, Var and Basses Alpes. 2nd, the South-Eastern, comprising a small part of Gard, Ardèche, Loire, the South of the Rhône, Vaucluse, Drôme, Hautes Alpes, Isère. 3rd, the Eastern, including Ain, Jura, Doubs, Haut and Bas Rhin, Moselle, Meurthe, Meuse, Marne, Haut Marne, Aube, Yonne, Saône and Loire, Côte d'Or. 4th, the Central, composed of the Loiret, Cher, Nièvre, Allier, and Puy de Dôme. 5th, the Western, sub-divided into two groups, the Marne and Loire, and the Indre and Loire, and the Charente and Charente Inférieure. 6th, the South-Western or basins of the Garonne and Adour, with the departments of Dordogne, Gironde, Landes, Lot, Lot and Garonne, Gers, Tarn, Tarn and Garonne, Haute Garonne, Hautes and Basses Pyrénées. Any person, however, little acquainted with France, on taking up a map of that country, must see at once how admirably these districts are grouped, and an easy reference thus facilitated.

SOUTHERN DISTRICT.

Corsica, an island in the Mediterranean, forms the French department *Corse*. It has a soil eminently fitted

for the production of wines, and there is no want of good vines; but from bad cultivation and want of care in manufacturing the wine, the quantity produced is very small, not more than one-tenth of which is exported. Both dry and sweet wines are produced. The most celebrated are those of Ajaccio, Cape Corsica, Corte, Serra, and St. Lucia. At Sartena, a fine red wine is made from the choicest grapes, the bunches of which are gathered and laid on a floor for at least a week before being pressed. This wine is very sweet for the first two years after it is made, but after that time it acquires strength and delicacy.

The wine exported from Corsica goes, for the most part, to Italy, where it is not unfrequently sold for Malaga, which it resembles, if previously mixed with * *boiled* wine.

The department of the Pyrénées Orientales contains upwards of 120,000 acres of vineyards. The wines produced in this department are known under its former name, Roussillon, of which there are the following recognised varieties :—Banyuls, Collioure, and Port Vendres, Rivesaltes, Perpignan.

Roussillon wines are of various qualities, and differ in taste, colour, and strength, according to the nature of the soil and species of plant from which they are grown.

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* The boiling of newly-made wine is an operation frequently practised in certain countries, especially in Spain, in order to give concentration, and a darker colour to the liquid. Boiling has also the effect of throwing down matter which would tend to acetify and spoil the wine if allowed to remain dissolved or suspended in it for any length of time.

The majority of them are strong, rich in colour, and generous in quality, keep well, and are good for mixing with others. In 1861 an inquiry was instituted by the British Government as to the strength of wines of the principal wine-growing countries in Europe; and Roussillon wine, in its pure state, was found to be the strongest of all French wines: yet they are seldom if ever exported to this country without being fortified with strong spirit.

In the communes of Banyuls, Collioure, and Port Vendres, a small quantity of *Grenache* wine is manufactured. It differs from the commonly-known Roussillon wine in point of aroma and lusciousness, and after being kept a few years obtains high perfection. This wine is not often allowed to ferment otherwise than in the cask, for it is longer in clearing itself when fermented on the murk or lees.

Roussillon wines are purchased freely at the time of the vintage by Paris merchants, and are used by them to a large extent for blending with the wines of the North.

At Port Vendres are some of the most celebrated wine cellars of the Continent; they are formed of solid masonry, and capable of holding many thousands of gallons.

Between Perpignan and Collioure the now celebrated *Masdeu* is produced. The vineyard, now held by a rich French banker, once belonged to the Knights Templars, and although Masdeu was not imported into this country until thirty-five years ago it was known and much prized on the Continent nearly six hundred years ago. It much resembles the wine of Oporto, and when Ports were dear a considerable quantity of Masdeu was used instead of, or to mix with, and cheapen them.

The commune of Rivesaltes, a few miles from Perpignan, produces the most celebrated of all Muscadine wines.

The wines of Aude, Hérault, and part of Gard are all comprised under the name of the "wines of Languedoc." They are reported to be among the strongest produced in France, and are remarkable for their deep rich colour, on which account they are much used for blending with the lighter wines of the other parts of France.

The principal portion of the wines of the department of Aude is consumed in France, and, with the exception of the choice wines of Limoux, are largely used for distillation into Brandy.

The *Blanquette* wine, or, as it is not unfrequently called, the Blanquette de Limoux, is the produce of the Canton de Limoux, and is of considerable value, being reckoned by some equal to Champagne. Great care is taken to pick out all the unripe and rotten grapes, and the choice ones, from which this wine is made, are allowed to remain upon the floors of the grower, that the saccharine element may thoroughly develop itself. Much care is taken in fining the wine through filters, and equal attention is paid to the bottling of it.

The department of *Hérault* is the largest producer of raw spirits in Europe, although its trade in brandy has for many years been decreasing. It is perhaps the most important wine country in the South of France, and, as previously mentioned, the wines are reputed to contain the greatest amount of alcohol.

The most choice wines of this department are *St. George's d'Orgues*, which have a fine lively colour, and

much bouquet; there are several other and inferior sorts, which are made to imitate Port, Sherry, and Madeira, and which imitations, after being highly fortified, obtain a large sale in this country.

The wines of *Nismes*, in the department of Gard, particularly St. Gilles and Costière, are held in high requte by Paris merchants. The former is strong, but not a delicate wine; it is exported largely to Paris, Holland, and Burgundy, and is used not only to mingle with wines intended for exportation, but to imitate Madeira, Ports, &c.

Bouches de Rhône, Var, and Basses Alpes, part of ancient Provence, produce a large quantity of wine, which from its generally low price is exported to various places in the Mediterranean, although the greater portion is consumed in the places of production, and the adjoining districts.

Cassis, in the Bouches de Rhône, produces the best wine in the province. At Gaude, in the Var, a fine highly-coloured heady wine is produced; and at Mees, in the Basses Alpes, a good red wine is produced.

There is little difference in the methods of cultivation in all the southern districts of France. The soil is in most cases dug before the vines are planted, which is done in the early part of the year. The vintage commences at the middle and continues to the end of September.

SOUTH-EASTERN DISTRICT.

The portion of the Gard included in this district produces two sorts of wine, namely, the red wine of Tavel and Lirac, and the sweet wines of Chusclan, Orsan, and

St. Geneiz. The red wines are very dry, and improve much with age, while the Chusclan wines are of the finest quality; those of Orsan and St. Geneiz being only of the second order.

Several ordinary wines are produced in this portion of the Gard, the best of which are the St. Laurent des Arbres and Roquemaure.

Vaucluse, in the principality of Orange, has upwards of 50,000 acres in vineyards, and produces nearly 8,000,000 gallons of wine, 300,000 of which are used for distillation, the remainder being chiefly exported. The most celebrated growth, and the one best known out of France, is the Châteauneauf-du-pape, of which about 300,000 gallons are annually produced.

At these vineyards the plants are put into the ground in the months of January and February, at a depth of about twenty inches. During the first three years the vines are dressed three times a year, but never manured. The leaves and buds are not picked off the vines. The vintage takes place between the 10th and the 20th October, the grapes being stripped from the bunches before they are pressed, and fermentation carried on for sixteen days or more.

After the wine has been about two years in wood it is bottled, and will keep a very long time. In the same principality is produced a very good wine, La Nerthe, of a value of about a franc the bottle, when two years old; but owing to the land being subdivided, and held by small proprietors, who are compelled to make sale as early as possible, these wines are mostly brought up by agents who

send them to Bordeaux or Burgundy, for the purpose of colouring other wines. Vaucluse has several other growths, among which are Château Vieux, Nieux, Nettes, and Etret.

Ardèche includes the three arrondissements of Tournon, Privas, and Argentière. The best wines of the department are produced at the famous vineyard of *St. Peray*, in the arrondissement of Tournon. It is a white wine, spirituous, delicate, and of a pleasant perfume, and when made in a state of effervescence, nearly equals Champagne, although not possessing quite so much lightness and delicacy. A large quantity is exported to this country, as well as to Germany, Belgium, and Holland; the best sparkling sort sells at from 2s. to 2s. 6d. per bottle.

The vineyards of Cornas and St. Joseph produce fine red wines, which are often sold as Hermitage, the second quality of which they fully equal.

At Argentière a sparkling white wine is made, by a somewhat peculiar process, the fermentation proceeding in large bottles, from which it is decanted every few days, until the sensible fermentation stops.

The department of Drôme contains most important vineyards, among them Valence, Montélimart, Larnage, Rochegude, Crozes, and Mercuriol, but the most famous in the Côte du Rhône is "*The Hermitage*," producing a wine much appreciated in this country; and one held in France to be the richest coloured of all their numerous wines.

Hermitage is a *church* wine in name, and if we believe what is said about the pious men of old—loving strong, rich wines—it may truly be said to be a church wine in richness and strength.

Many romantic stories are told of the origin of this vineyard; one of which is, that a hermit located on the top of the once uncultivated hill, almost overhanging Tain, and immediately above the rapid Rhône, amused himself by breaking the stones around his dwelling (the ruins of which still exist), and planting vine slips among the pieces, and that these vines succeeded so well that the inhabitants of the neighbourhood soon copied him, and turned the uncultivated hill into what it now is, one of the choicest vineyards of France, although it is the centre of the hill alone that produces the veritable Hermitage.

Along the valley of the Rhône "vins des Côtes du Rhône" are produced, and are all of fine flavour, full bodied and strong. The majority are sold in this country and in France as "Hermitage," from being produced in the vicinity of the vineyard of that name.

The Hermitage, originally the property of M. Manier de la Sizeranne, is enclosed within a wall, and the grapes thereon are never gathered until fully ripe. It produces red wine, white wine, and "vins de paille" (straw coloured); the red, however, forms three-fifths of the crop.

Red Hermitage is not removed from the cask for bottling, if of the first-class, for nearly five years, and although the price is regulated more by the demand for exportation than by the quantity or quality of the vintage, the best seldom sells for less than 3s. to 3s. 6d. per bottle. In the "Report upon the Strengths of Wine," by the Customs, we find that a sample—of what the proprietor considered the finest and strongest wine ever produced at the Hermitage—vintage 1850—was tested, and, notwithstanding its age, upwards of eleven years, con-

tained 25·2 per cent. of proof-spirit in its natural condition.

The finest white wine France produces is white Hermitage, when it is of the first quality; and, if properly fermented, this will keep for any number of years. Very little of it is exported, the second quality being generally passed off as the first when it is required for exportation.

"Vins de paille," or straw-coloured Hermitage, is produced from the white grapes dried on straw for several weeks. Little is made, and when in perfection a great price is obtained for it.

Rhône is a department producing good wines, somewhat similar in character to those of the Drôme. The best white wines are those of Condrieu, grown at Colombe; and of the red, those of Côte Rôtie, Chesnas, Fleurie, Brouilly; the second growths of Julliénas, Fleurie, St. Etienne, Chassagny, &c.

Isère produces wine of only an ordinary quality, the best of which is grown near Vienne, and that is but indifferent, and will keep but a very few years. This department would produce much better wines if more attention was given to the treatment of the vines, which are now all but neglected.

EASTERN DISTRICT.—BURGUNDY WINES.

The valley of the Saône forms the principal portion of this district, and produces the best wines. M. Rendu includes in it the valleys of the Rhine, Moselle, and Meuse, which do not, however, yield wine of the first quality. It may be stated generally, that the wines of Burgundy are the produce of grapes reared in the low

chain of hills running from Dijon to Maçon in the department of the Côte d'Or.

In the department of Saône-et-Loire, to the south of Burgundy, are grown the wines known as Maconnais and Beaujolais, which are light, and well flavoured, but not highly coloured. To many the chief objection to them lies in their somewhat strong, earthy flavour. The latter wine is in such repute, that nearly every sort of cheap French red wine is now called Beaujolais. The white wines of Pouilly, and the red wine of Romanèche, are the best of Maconnais, both possessing a great percentage of strength. The principal depôt for these wines is at Mâçon.

Ancient Burgundy now forms the departments of Yonne, Côte d'Or, and Saône-et-Loire, where for sixty miles the most celebrated vineyards extend. In describing the wines of Burgundy, Dr. Henderson says, "The best wines of this province, though not so popular in England as Champagne, probably because they are apt to be injured by a sea voyage, enjoy the highest reputation. In richness of flavour and perfume, and all the more delicate qualities of the juice of the grape, they unquestionably rank as the first in the world; and it is not without reason that the Dukes of Burgundy, in former times, were designated as the 'Princes des bons vins.'—(Princes of the good wines)."

* *Côte d'Or*, thus named on account of the quality of its vineyards, is the most important portion of Burgundy. It contains thousands of acres of vine-lands, and produces

* Literally, the "golden hill district."

the most famous Burgundy wines, such as those of Montrachet, of Meursault, and of Blaquy, as well as the renowned Volnay and Pomard. There are also the celebrated vineyards of Beaune, Nuits, Romanée, Clos Vougeot, and Chambertin.

The most perfect white wines of Burgundy are those produced in the vine grounds of Mont Rachet, which are divided into Mont Rachet Ainé, Mont Rachet Batard, and Mont Rachet Chevalier; but the first is the true Mont Rachet, and its produce commands an immense price. It possesses a powerful, fine flavour, with an extraordinary degree of richness; and although it bears little resemblance to the wine of Tokay, it equals it in renown, and is considered by many quite as delicious.

Meursalt is the produce of the vineyard of Santenot. It is a much prized and celebrated white wine. A red wine is also produced here, which is said to equal the Volnay, a fine delicate light wine. In the neighbourhood of Meursault a light wine is grown, possessing a peculiar and almost sulphurous taste.

Not far from where the Volnay and Pomard are produced, is the vineyard of *Beaune*, producing the well-known wine of that name.

At Nuits is made a most exquisite wine of great bouquet and delicacy. In this little town are some very extensive cellars, where a large stock of all the wines of Côte d'Or is constantly kept. Within a few miles of Nuits is the village of Vosnes, where the choice Romanée, St. Vivant, Romanée Conti, Richebourgh, Grand Rue and La Tache are produced, and but a short distance from Vosnes is Clos Vougeôt and Chambertin.

Chambertin was the favourite wine of Louis XIV. and of Napoleon; and the first-class is almost exclusively consumed in France. Its aroma and delicacy are perfect, and it will keep any length of time.

Wine freezing.—In this district it is the practice of some of the proprietors to add a quantity of sugar to the juice of the grape, while others increase the strength of the wine by a process of freezing, which is thus described by Mr. Ogilvy, Inspector-General of Customs, in his report on the Wines of France, previously referred to—"In Burgundy, the strength is also artificially increased after the wine is made, by the process called 'congelation' or freezing. Formerly this operation was effected in the winter, during the frosty weather, by rolling the casks into the open air, opening the bungs, and covering the casks up with snow and ice; but this method, though cheap as regards the means of operating, often proved dear in the end, as the weather was uncertain, and if too cold, the wine froze too rapidly; if the frost, as was frequently the case, suddenly broke up before the completion of the operation, the wine was spoilt. It has been found better, therefore, to freeze the wines by artificial means, by putting it into large tin vessels, which are immersed in a mixture of pounded ice and salt; and the operation is carefully watched to prevent its being carried too far. The principle on which this process is based, is, that water freezes more readily than spirit or wine. The water naturally contained in wine is in part frozen, and thereby separated, when it is taken out and thrown away, by which the bulk of the wine is decreased, and all its properties condensed and made more per-

ceptible; but as the bad qualities are condensed as well as the good, this operation is only useful in very fine and faultless wines. In the same district, a quantity of raw sugar is often mixed with the grapes at the time of pressing, the object being to give body and to hasten fermentation. This addition of sugar must, to a certain extent, increase the quantity of spirit in the wine; but I was assured, on good authority, that it does so only to a very trifling extent, and short of the quantity that would be produced by simply fermenting an equal quantity of sugar in the water, the wine decomposing the sugar, and preventing its fermentation. In the only instance of this process which came under my notice, about a half-hundred weight of sugar was added to each 100 gallons of wine."

Chablis.—Of the white wines of the Yonne, those of *Chablis* excel all others, but large quantities of other white wines are sent into the market as Chablis, when they have scarcely a resemblance to them, and possess none of their excellence; in fact, as Beaujolais has to stand for all the cheap red wines of France, so has Chablis to sustain the character of all the many white wines sold under its well-known name.

The wines produced at Alsace, in the departments of Haut Rhin and Bas Rhin, are with some few exceptions of an ordinary character, and but little exported. In the first department those of Turcheim and Ribeauviller are the best, while of the Bas Rhin, Neuvillers and Wolxheim rank highest.

The vines of the Jura are but indifferently cultivated, and although some of the wines, such as those of Arsure

and Arbois, are dry and full bodied, they all contain an acidity which they would not possess were proper attention given to their production.

The department of Moselle produces wine of only an ordinary quality, those generally understood as Moselle wines being grown on the side of the Rhine, now possessed by Germany, and we refer our readers to the chapter on German wines for information regarding the true Moselle.

Meurthe, in the same province, produces a large quantity of wine, the principal growths of which are the Pagny, Thiaucourt, and Côte Rôtie.

Champagne.—The ancient province of Champagne is celebrated for producing the most elegant and exhilarating of all French wines. Lightness, delicacy, perfume, flavour, and transparency are united in them, as indeed are all the qualities of the finest wines. They are divided into two classes, white and red, and these again into sparkling, ordinary sparkling, half-sparkling, and still. In itself Champagne is almost colourless, and consequently those kinds called "partridge eye," "amber," "pink," and "rose" are artificially coloured. This colour is sometimes derived from the skin and pellicle, when the grapes become excessively ripe, but in all other instances it is produced by the addition of an infusion principally taken from elderberries.

The arrondissements of Rheims, Epernay, and Châlons, with their hills, plains, and undulations, are covered with vines, the deep green leaves of which give to the country a peculiar appearance. In all the most celebrated vineyards, such as Mareiul, Ay, Hautvillers, Dizy, Epernay, Bouzy, Verzenay, Muilly, &c., the black grape is cultivated,

but white grapes are also grown in many of these vineyards, and when judiciously mixed with black, they produce some of the most favourite Champagnes; for while the black grapes—forming about two-thirds—give strength and body, the white impart richness and delicacy. The vintage in favourable seasons begins about the third week in September, and in ordinary seasons not sooner than the second week in October. To make the purest wines, only the most approved and perfectly matured grapes are employed. The best wine is made, as above stated, from a black grape of very fine quality known as the *Noirien* or *Pineau*, grown in the Champagne district.

Immediately after being picked, the grapes are carried to the press as carefully as possible, so as to avoid every movment likely to injure them. The same care is taken in placing the fruit in the press. To prevent the juice from being coloured by the skin of the grape, the fruit is placed under pressure as soon as possible after being gathered. Very powerful machines are used for this purpose, since the Champagne grape, unlike other varieties, is not previously crushed. If from any circumstance, the pressure is not completed by the end of two hours, the "must" will have become coloured by the grape-skins, and the quality of the wine injured to that extent. Generally, the first is pressed four times. In good seasons the yields of the different pressings are mixed together, and in middling seasons the produce of the three first pressings only is used in making the choicest wine, the yield of the other pressings, being harsh and coarse, is only used for the second class, although when fortified with strong spirits, a large

quantity is sent to this country, and liked by those who prefer strength to flavour and delicacy.

The light coloured "must" is first conveyed into a large vat, where it is suffered to remain for six, twelve or eighteen hours, according to the temperature; at the end of this time certain vegetable matters that would injure the flavour and brightness of the wine, as well as render it liable to a second fermentation, become deposited. After the new wine has remained in the vat a sufficient number of hours to deposit dregs, it is drawn off into barrels of about 450 gallons capacity, in which it undergoes fermentation. After the first fermentation has ceased, the wine is racked off and fined with isinglass; a second racking and fining takes place in about a month afterwards, at which time the young wine is blended with that of other vineyards, it being admitted by all experienced makers that wines judiciously blended are superior in quality to those of any one kind or growth, as well as less liable to deterioration in keeping. Sometimes the clearing of the juice is effected by filtration; at other times when the weather is warm, and fermentation sets in so rapidly, as not to allow the impurities to subside, the "must" is run into casks still filled with the fumes of burning sulphur, a practice also adopted in the case of Cider-making—by this means, excessive fermentation is checked, and sufficient time is given for the dregs to settle. The juice having been made clear by either of these methods, is drawn into barrels, these being filled to the bung, the froth formed during the working flows out at the bunghole.

The wine intended to effervesce is bottled in March or

April, the "still" wine in August. This is an important operation, and too much care cannot be bestowed upon it; for to obtain a brilliant sparkling wine, without the risk of increasing the effervescence to an extent that would make the breakage excessive, the amount of saccharine must be strictly considered. When there is a deficiency, dissolved sugar-candy is added, to an extent necessary to make a sparkling effervescing wine; when there is an excess of saccharine a small quantity of still wine is added to counteract it.

Bottling.—Effervescence is produced by the escape of carbonic gas, resulting from fermentation, which, being interrupted in the cask, reproduces and develops itself in the bottles. The bottles have to be selected with the greatest care; they must be new, symmetrical, and of equal thickness throughout. Every bottle with an air-bubble in the glass, or with the slightest malformation, must be rejected; and every one should be strong enough to resist a pressure equal to 20° of the "manometer" (pressure gauge). The breaking of bottles is a serious item in the cost of making Champagne; it seldom amounts to less than 15 per cent., and in years of great heat it exceeds that proportion considerably, unless the wine be early removed to very cood cellars. After being filled, the bottles are, if the wine is required to effervesce rapidly when opened, stored above ground; if otherwise, they are at once placed in underground cellars.

The bottles thus treated in the month of March are removed in the following October to another cellar where they are kept until sold to dealers, who at this time of the year, make purchases of the *raw* Champagne and

prepare it for the market. This is done as follows :—each bottle is well shaken so as to distribute the sediment thoroughly through the liquid; it is then placed on a table with the mouth inclined downwards. Gradually the whole of the sediment, called "griffe" falls to the bottom of the cork, on which the cork being skillfully withdrawn, a small quantity of wine rushes out carrying the impurity away with it. About one fifth part is then taken out of the bottle to make room for the introduction of syrup. It is the amount of the sweetening matter thus added that gives a special character to the wines of each maker. Wine intended for hot countries has an extra quantity of syrup put into it. In many instances also, Brandy is added to Champagne set apart for the English market. The adding of the syrup, the corking, tying, putting on the foil and label, and wrapping up in paper ready for packing, is performed by separate persons.

Many people in England suppose that all Champagne effervesces, but that is not the case, for "Sillery," so much prized in Europe, does not sparkle at all, and the most choice and exquisite Champagnes are those which only slightly froth.

Champagne is distinguished according to the strength of its effervescence as *Mousseux*, *Demi-Mousseux*, and *Crêmant*; of these the *Mousseux* (strongly frothing and sparkling), is the most highly charged with gas; *Crêmant* (so called from its presenting a quiet, *creamy* surface) the least so. *Demi-Mousseux* is, as its name implies, intermediate in sparkling quality between the two others.

Many makers keep in stock only the best quality of Champagne, made from the first three pressings of the

very best grapes, while others keep more than one quality, putting a fanciful brand on the inferior, and their own brand on the first-class; others brand their inferior wine with the fabricated trade-marks of the best houses. Many German light, sparkling wines, such as Rhenish, Maine, Neckar, &c., are fraudulently sold as Champagne, with well-known French names attached to them; and so lucrative is the trade, that the juices of pears and gooseberries are not unfrequently employed for making spurious Champagne. Of the total quantity of Champagne consumed in Paris, it is considered that at least one-half is not genuine. The wholesale merchants, according to the Returns of the Chamber of Commerce of Rheims, have hardly ever less in stock than a quarter of a million bottles of Champagne, while the consumption in France has for many years been about two and a half-million bottles—about one third of the total consumed out of France. The cellars in which the vintages are contained are cut out of the calcareous (limestone) rock. Those of M. Moët, at Epernay, are of immense extent; the bottles, rising many feet in height, form a perfect labyrinth.

CENTRAL DISTRICT.

This region consists of five departments, possessing at least 400,000 acres of vineyards, but the wines produced are inferior to the same class of wines of Burgundy and Maçon, and few of them are exported to this country.

The department of Nièvre may be said to grow the only sort worth mentioning, and here, in the arrondisse-

ment of Cosne, the somewhat famous Pouilly is produced. It is a dry white wine, which keeps well; in Paris, where a considerable quantity is consumed, it bears a good reputation.

WESTERN DISTRICT.

No wines of first-rate quality are produced in this district, yet it is one of the richest parts of France, owing to the enormous quantity of brandy manufactured. In Annis, Saintonge, and Angoumois alone, not less than 50,000,000 gallons of wine are, in plentiful vintage-years, yearly devoted to distillation, producing brandy to the value of £2,000,000 and upwards.

The two departments of Maine and Loire, and Indre and Loire, produce both red and white wine, all of an ordinary quality, which are mostly consumed in Belgium and Paris. In the first department the wines of Saumur are the best, while Joué and Vouvray are the best of the latter.

SOUTH-WESTERN DISTRICT.—BORDEAUX WINES—CLARET.

Of this district, where the cultivation of the vine is carried on so extensively, the department of the Gironde is the most important.

The wines here produced are known in England generally under the name of "Claret."

The department of the Gironde or of Bordeaux possesses upwards of 350,000 acres of vines, and produces upwards of 51 millions of gallons of wine. The wines have a common origin, and all pass under the same

denomination, although not of one quality. They are divided into five classes : Médoc, De Graves, Des Côrtes-Palus, and d'Entre Deux-mer, of which the first four are the best.

The Médoc district is a large plain or tongue of land lying between the river Gironde and the sea, from which it appears to have been reclaimed. Here are produced the best wines, distinguished as "grands vins," or "vins classés," the first of which are divided into five classes, each representing a certain delicacy or quality. The following rank highest: Château-Margaux, Château, Laffitte, Château-Latour, and Château-Haut-Brion, although there are other vineyards of much celebrity.

Château-Margaux produces yearly about 20,000 gallons of wine, of great delicacy and rich flavour. It is a fine stomachic, without being intoxicating. Château-Laffitte, produces nearly 30,000 gallons, the Château-Latour upwards of 16,000 gallons- The two last are perhaps stronger than the first, but not so delicate, while all of them are esteemed more for their bouquet than their alcoholic strength; and, when in perfection, they have a balmy taste, leaving the mouth cool and breath pure.

Château-Haut Brion, in the district Graves (so-called from its gravelly soil), situate in the plains around Bordeaux, produces a more powerful and highly-coloured wine than either of those previously mentioned, and while the red wines are perhaps not equal in excellence, the white wines have an universal reputation. The wines of Haut Brion require to be kept in the wood before bottling a much longer time than the others. The wines

which do not belong to any of the fine *vins classés*, or classified wines are termed "citizens," and "peasants." The first of these have also degrees of quality, namely, superior, good, and ordinary citizens, but the "peasants" are regarded for the most part as of only one class.

To the south east of the Graves district, and bordering on the river Garonne is the district of *Sauterne*. The first quality of Sauterne, a full, sweetish white wine, is consumed principally in Russia; the second quality containing little or no sugar after fermentation, is that which reaches the English market.

The first growths of the Médoc are seldom or ever sent to this country without being first mixed with other wines of strong spirits, as they are found not to be sufficiently spirituous for the English palate. Hermitage and other wines are frequently added to give body, but in nearly every instance of such addition, the delicate flavour is sacrificed to obtain strength. Immense quantities of wine from almost every part of France are blended in greater or less quantities, and sold as Claret; and not many years since, it was known that the sale of Château-Margaux in one year was at least ten times more than had been produced.

St. Emilion wines, produced in the district of that name, in the arrondissement of Libourne, have been known and esteemed in this country for several centuries. About 25,000 acres are devoted in this district to the cultivation of the vine, producing upwards of 700,000 gallons of wine. The St. Emilion wines are fine, but thinner and paler in colour than the Médocs.

On the south-east of Bordeaux, in addition to Sauterne,

Barsac, Preignac, and Bommes are produced, all of which are strong, fine, and transparent.

The wines of St. Julien and St. Estèphe, although wholesome and of good flavour, are inferior to those enumerated as first-class.

In no part of France is the cultivation of the vine more attended to than in the Médoc. The method differs from that of other parts of France. The plants are placed about three feet from each other, and dressed from five to six times in the year. Each plant, after it has attained the height of twelve or fourteen inches, is supported by two props. To these props are attached laths or "espaliers," several feet long, to which the plants are trained and attached; and thus, in addition to receiving greater heat, are prevented from touching the ground. Immediately after the blossoming, the buds and leaves are picked off.

At one time, the practice of pressing the grapes with the feet, after they had been separated from the stalks, was almost universal, but this custom is now seldom adopted, presses of the most approved construction being general over the greater portion of the district.

It is almost impossible to give anything like an average value of the wines of the Médoc. In some years, what would sell at £10 per hogshead, would the previous year be sold readily for ten times that amount. We, however, quote what M. Rendu gives as their ordinary value:—

1st Class (extra).....from 2,000 to 5,000 francs per tun. *
2nd ,, ... ,, 1,200 to 1,400 ,,

* 1,000 francs equal £40 English.

3rd Class.....	from	800 to	900	francs per tun.
4th ,, ...	,,	700 to	900	,,
5th ,, ...	,,	600 to	700	,,
Bourgeois, 1st quality..	,,	400 to	500	,,
Ditto, 2nd ,,	,,	300 to	400	,,
Paysan.....	,,	300 to	325	,,

In the department of Lot, the "Cahors" wines are produced, strong in body, but with little perfume. They are principally sent to Bordeaux for mixing.

In the department of Gers upwards of a million gallons of brandy are annually produced, one description of which, the "Armagnac," is little, if at all, inferior to Cognac.

Chapter Third.

WINES OF SPAIN.

Large importation of Spanish Wine into England—Districts of Port St. Mary, San Lucar, and Xeres—Mountain Wines of Cordova—Sherries—Amontillado, Montilla, and others—Cause of the flavour of Amontillado—Manzanilla Wine—The Wines of Catalonia, Aragon and Valencia—Tent or Sacramental Wine—Plastering of Sherries—Mortar mixed with Wine in the Wine Districts of Old Castille—Strength of the best Wines of Spain.

Of the total quantity of wine imported into this country from all quarters, Spain sends us at present no less than one third. But within the last few years there has been an immense falling off in the quantity of Spanish *white* wine brought over, a falling off amounting in ten years to as much as five millions of gallons. Spanish *red* wine has, however, during this time kept its level very nearly, in spite of a strong revival of taste in favour of Port.

It is in the district lying between the Guadelete and Guadalquiver rivers, and within the angles formed by Port St. Mary, San Lucar, and Xeres, that the strongest and best description of Spanish wines are produced. From the latter town they take their original English name Sherris, which has since been altered to Sherry.

Sherry.—In the district of Xeres, every improvement which capital and skill can command is employed in the manufacture of the wines, and every spot of ground having a favourable aspect and suitable soil is utilized in the cultivation of the vines. In many other parts of Spain,

where the like attention is paid, the wines are rapidly improving, and nowhere more so, perhaps, than in the neighbourhood of Cordova, where the mountain wine, known by the name of *Montilla*, is produced.

The Xeres vineyards produce about 36,000 butts (400,000 gallons), of all qualities each year. The grapes are spread on the platform bearing the press, and dusted once with plaster of Paris; they are then trodden or pressed; the resulting juice or must is not richer in sugar than that of the principal vineyards of France or Germany. Fermentation is conducted as rapidly as possible; the wine when clarified is racked, and has then about the same alcoholic strength as the general run of other wines, viz.: from 18° to 24° of proof spirit. Brandy is now added to it without delay, so as to prevent as much as possible a second fermentation, with its frequent accompaniments or results of fungus, ropiness, &c., which spoil the wine for a time, or in many cases permanently. In its natural state, Xeres wine ripens quickly, but the addition of brandy retards the natural maturing and alters the character. Owing to this fact, Sherry is rarely obtained by the consumer in a natural state.

All sherries are naturally pale. In some cases the wine is blanched by animal charcoal. The sherries sent to this country as "Old Brown" do not owe their colour so much to age, as to an addition of wine produced near San Lucar, which, without being fermented, is boiled down in an earthen vessel until it has lost three-fourths of its bulk and becomes quite thick and luscious. This is then added to the pale wine, to give the colour and the richness of flavour required.

The use of plaster of Paris above alluded to has the effect of depriving the juice of its natural tartaric acid, and impregnating it with sulphuric acid, which remains in the wine combined with the potash previously allied to the tartaric acid; the sulphate of potash thus introduced into the wine causes inconvenience to persons of delicate digestion, and not unfrequently compels them to abstain from further use of the wine. In some cases the must is not only "plastered" as just described, but subjected also to the vapour of burning brimstone when in the vats. This vapour as it is absorbed becomes gradually converted into sulphuric acid, and remains in the liquid for the most part in a free state, so that many Sherries are found to contain as much as from three to five pounds of sulphuric acid per butt (108 gallons). As a set-off to the disadvantages of this process in respect both of flavour and the health of the consumer, it may be said that the wine is protected to a great extent from the effects of the fungus, &c., by the plastering, brandying, and sulphuring to which the juice is subjected. But a better mode of attaining the same results is much to be desired, and will probably be discovered in the future by the aid of careful scientific experimentation. Pure natural Sherry, if it could be maintained in a sound condition by some simple, innocuous treatment, would be beyond doubt one of the finest wines in the world.*

The choicest of all Spanish wines is *Amontillado*, although its peculiar flavour is as yet a mere matter of accident, and cannot be produced at the will of the

* See a defence of "plastering," page 158.

maker. This flavour was originally considered to spoil the wine, much as it is now esteemed; a fungus forms by the action of the air on the surface of the wine when put into casks which are not quite full, this fungus gradually disseminates its spores or seeds through the bulk of the wine, and these impart the flavour characteristic of Amontillado. (But see another explanation of the Amontillado flavour, page 155).

When the light dry wines intended for the English market are drawn off the lees, about three gallons of spirits are added to each butt, but this is not done to wine likely to turn out Amontillado, as it will admit of no addition of spirit, and it is not until the casks set aside for producing this wine are found to fall off that any spirit is added. Out of perhaps seventy casks containing the produce of the same vineyard, carefully stored and treated, not more than seven will perhaps have the characteristics of the wine in question.

Manzanilla.—Between Xeres and San Lucar the vineyards producing the much-prized Manzanilla are situated. No other Spanish wine is so dry or improves more with age. It is delicate and pure, and considered an excellent tonic wine. No addition of spirit can be made without destroying its taste and flavour. Nearly four centuries since, this wine was held in the greatest estimation in England.

Malaga is celebrated for its sweet Muscatel wines, the choicest of which is the sweet mountain Lagrima, which fetches in the province 3s. 6d. per bottle, when one year old. The annual average produce is about 25,000 butts, of which the greater portion is exported, a considerable

quantity going to Xeres, to aid in making up the sherries of that district. No special treatment of the wines intended for the English market is adopted at Malaga, as all for exportation are treated alike, receiving between the first and second fermentation, an addition of from eight to ten gallons of strong spirit per butt, a quantity considered only sufficient to preserve it. It is said that three butts of Malaga wine yield one of brandy, while ten butts of French wine are required to produce the same quantity.

The *Rota Tent* wine is produced at Rota, nearly opposite Cadiz. This partakes rather of the character of a syrup than a true wine. It is made by mixing a portion of thin grape juice with another portion previously concentrated by heating; only a slight fermentation takes place owing to the density of the liquor, and the strength is seldom higher than 12 per cent. of proof spirit. It is generally used in this country for sacramental purposes, for although rich and luscious, it contains very little spirit.

Catalonia, *Aragon*, and *Valencia*, all produce excellent wines. Red Catalonia sweetened and brandied is now imported into England, under the name of *Spanish Port.* The wines of Valencia are rather perishable, and are now chiefly used for the distillation of brandy. Almost all the wines last mentioned, white as well as red, are *plastered*, some, no doubt accidentally so, from being kept in underground cisterns built and lined with Plaster of Paris. *Gypsum* (sulphate of lime) abounding in the neighbourhood of the vineyards, blocks of it picked up from the fields are occasionally employed to keep the "murk" submerged in the fermenting wine; and it is probable

that the practice of plastering Spanish wines generally, now so common, took its rise from observing the preservative effects produced by the action of this material.

In some provinces of Spain there has been even since the disease called *oidium* attacked the vines, a superabundance of produce; and in a report presented by the Secretary of Her Majesty's Legation at Spain, it was remarked that, a proprietor of extensive vineyards at Huesca, in the province of Aragon, stated that the drought one summer in recent years was so great, and the vintage so plentiful, that it would have been easier for him to irrigate his vineyards with wine than water; and that in order to make room for the new wine, he had on one occasion offered to sell that of a former vintage at two sueldos the *cantaro*—about 5d. English for a little less than four gallons—but finding he could not even get one *real* for the cantaro (about one half-penny English per gallon), and there being a scarcity of earthen wine jars or vats, he was obliged to throw away the whole of that year's vintage. The same report, in speaking of the prolific nature of the wine districts of Old Castille, says, "An English gentleman, on passing through the town of Aranda-del Duero, a few years since, saw some bricklayers at work mixing their mortar with wine instead of water; and he stated that it was not an unusual occurrence, as there were several instances of houses in that town having been built with mortar prepared in the same way."

Reasons for brandying wine.—In Xeres and generally in Spain and Portugal there are no cellars; the vines are always pressed and the wines fermented and kept in buildings above-ground, constructed for the purpose,

mere sheds, termed in Spain *bodegas*, in Portugal, *adegas*. These sheds are subject to all the variations of temperature of the air, and the wine in cask is constantly influenced thereby. Under these conditions wine would almost inevitably become vinegar, were it not heavily brandied. It will thus be seen that the growth of fungi, and the use of these *bodegas* must be amongst the chief causes which either spoil the wine in their own way, or lead to its being spoiled just as effectually in another way, viz.: by the additions of substances for the prevention of mould, ropiness and acid. It may be confidently said on the subject of Sherry, that the marked disuse of it in this country for some years past is chiefly referable to the treatment of the wine in the bodegas or open sheds above described, and the growing practice of plastering; a really natural or but slightly-fortified Sherry at a moderate price will always command custom in England. Pure light Sherry is considered by doctors as invaluable in promoting recovery from certain lingering disorders.

The average strength of the best Spanish wines may be stated as follows:—

	District.	Strength in degrees of Proof Spirit.
Sherry	Xeres	27·9
Do. (Amontillado)	Do.	35·4
Montilla	Montilla	33·3
Vino Fino	St Lucar	27·9
Do.	Port St. Mary	29·2
Val de Penas	Val de Penas	31·3
Benicarlo	Benicarlo	31·3

Chapter Fourth

WINES OF PORTUGAL.

The River Minho and its surrounding vineyards—Methuen Treaty—Monopoly of the Douro Wine District, and its effects—The Alto Douro Company—Brandying Wine—Revived taste in England for Port—Consumption on the increase—Warehouses at Villa Nova—Method of blending and preparing Wine for shipment—Quantity of Port brought into England—Natural Strength of the Wines of Portugal—Wines of Tagus, Lisbon, Bucellas, and Calcavellos.

PORTUGAL is separated from its great rival wine-producing country, Spain, by the River Mino, along the banks of which are to be seen some of the most charming vineyards in Europe. It would have been fortunate for Portugal had she, like her neighbour, allowed that fair competition in the production of wine which is so essential to the success and improvement of every article; and equally fortunate would it have been for the English consumers of Port if they had never entered into that unwise commercial arrangement, the Methuen Treaty, * so called after the name of the English ambassador who negotiated it.

In 1756 Portugal granted a monopoly of the wine

* For an account of the Methuen Treaty, see page 18 & 19.

district of the Upper Douro to a company whose professed object was to preserve and enhance the character of the wines to be exported, by raising the standard of cultivation, fermentation, &c., and by having persons appointed to classify the wines according to their value. This arrangement would perhaps have done good had the company carried out the conditions upon which they receive their charter; but no sooner did they obtain the power of prosecuting all out of their district, than they began to do everything themselves that would increase the value of the monopoly, although the means employed injured the wine far more than anything ever before practised. The result was that Port wine became changed; instead of being the juice of the finest grapes, carefully selected, it was the produce of good and bad fruit, heavily brandied, while, by controlling the stocks this company was enabled to raise the price of their inferior wines to a point which the best qualities had never realized.

In 1833 this monopoly was abolished, and no other established until 1843, when the Alto Douro Company sprang into existence, with powers, which if not equal to those of the old company, were great enough to cripple the operations of all producers out of their district, and also to lower rather than raise the quality of Port, while keeping up an unduly high price.

The principal wines of Portugal are those produced in the Alto Douro district, and shipped from Oporto. Hence has the name Port. It is the vine and the vine alone which led to the cultivation of any part of the Alto Douro hill-region. The vineyards are constructed with extraordinary

labour and in face of many difficulties, a contrast to the soft, undulating character of the vineyards of Xeres, where the vine is planted and reared with so much ease and profit. The vineyards in the Alto Douro are all laid out in terraces constructed of stones; sometimes a mountain side will have as many as a hundred and fifty terraces and walls. The Douro vines are of medium size like those of the Sauterne-producing vines of the Gironde in France. The vintage takes place between 20th September and 10th October, that is, as late in the year as is compatible with the safety of the crop, so that the juice shall be as strong and sweet as the sun will make it; the grapes are trodden by men on platforms, and the "murk" and juice are removed to stone-built vats, called *lagasres*. When fermentation has so far proceeded that the amount of alcohol formed has dissolved all the available colouring matter, the mixture is well stirred up, and the wine drawn off. The mixing is effected by men standing in the vats; these serve as living stoves to keep the wine up to the proper fermenting temperature in cold weather. In good vintage years, when the wine contains more sugar than can be used up in a first fermentation, brandy is added, but in years in which sugar is deficient, both spirit and sugar have to be supplied. The usual way of sweetening is to add concentrated grape juice preserved in spirit; this syrup is called *Jeropiga*. As a rule Port wine contains so much colouring matter naturally, that white jeropiga is all that need be added to it. The stories about the juice of elderberries being used to deepen the colour of Port will be shown on page 64, have no foundation in fact.

Port wine is never *plastered;* the only extraneous addition to it is brandy, of this the smallest quantity employed is about three gallons to the pipe (115 gallons), but the so-called "rich" wines contain from 15 to 17 gallons of added brandy in every pipe.

The tract of country under the sway of the Alto Douro Company, commences about 55 miles up the river Douro, and is known as the Upper Corge. It is about 20 miles square, with the river running through the middle. It is in this district that the agents of the large Oporto houses may be seen at the time of the vintage, making their purchases, which in a few months afterwards are sent to their warehouses at Villa Nova, where they are blended and stored before being prepared for shipment.

The method generally adopted in preparing wines is to blend the contents of a number of casks together, adding brandy and colouring matter—if sufficient of the latter is not already present, and bringing them to a uniformity of lots. It is from these lots that the English wine merchant is supplied with Port at almost any price; for if the lowest lot in the warehouse, or lodge as it is called, is worth, say £20 per pipe, and the others are of intermediate values up to £80; an order (at, say £25, £30, and £40 per pipe) is executed by taking a quantity of the lots that will make a wine of the value, colour, and condition required.

Consumo.—A low-priced, natural, dry, red wine, termed "consumo," meaning a wine for ordinary use, grown in the Douro valley is now imported into England: it contains only 20 per cent. of proof spirit, thus

esembling in strength Burgundy of the stouter class. A ariety of Port was formerly made from white grapes, nd much used in Ireland, but it is rapidly going out of onsumption there and in all other places.

Of other Portuguese wines may be mentioned those of he neighbourhood of *Lisbon*, which are nearly all sugared nd brandied. *Bucellas*, made from the Arinto grape, upposed to be identical with, but probably only resembl-ng the Rhenish Riessling grape, and the wines of Carcavellos. But both Bucellas and Carcavellos wines re now almost unknown, the vineyards having been estroyed with little exception by the *oidium* disease. Much red wine is made in the Torres Vedras valley; all xported to France to be sold as Bordeaux wine (Claret). Collares is grown below the district of Cintra, and is nostly consumed at Lisbon.

The rest of Portugal teems with wine, but it is so badly nade as to be unfit for any foreign market. The Portuguese government is, however, taking great pains to pread information amongst the cultivators of the soil, nd the reports of their commissioners are most important nd instructive records of observations on the best nethods of vine-culture, not only locally but in general.

The commercial treaty of 1860 with France has had the ffect of so far modifying the taste which had been cquired in this country for wines of a sweet, heady, ighly-coloured description, as to beget a gradual liking or the thinner, cooler, but far more genuine wines upplied by France, Germany, &c. Port wine, is, no loubt preserved, and the flavour scarcely impaired by a udicious addition of brandy; but this practice has until

recently been carried to a most objectionable excess, with the view, no doubt, of satisfying the taste of the English for a strongly alcoholized drink, whether it be presented in the form of wine, ale, spirits and water, or any other intoxicant. Besides, the spirit added in such quantity to the wines of Portugal, and indeed of several other countries, is not genuine brandy, however common in quality; it consists for the most part of potato-spirit or of a coarse alcohol exported from England to the wine-producing kingdom, and then returned to us in the Ports and Sherries prepared for our market.

It used, in fact, to be asserted in Portugal that too much strength and colour cannot be given to the wines shipped to England, as those that are pure, light-coloured, and unadulterated were in no demand; this, to some extent, may have been true, owing to the large shippers and vineyard proprietors having been mere manufacturers rather than producers, and having thus created an artificial taste in this country (which did not exist before the Methuen Treaty) for their compounds; but this taste is every year wearing away, as is proved by the returns; for in 1840, when the duty on all wines, except Cape, was alike, the quantity of Portuguese wines entered for consumption was more than that of 1883, although the population was many millions less; and it would be well for those interested in the production of Port to remember, that even if the taste for highly alcoholized wines in England were to continue as strong as it used to be, France is able to furnish a large supply of wines of that description, although not, of course, possessing the peculiar odour and flavour of the Oporto wine.

A vast improvement has, however, set in of late in the mode of preparing Port wine for foreign consumption, and especially for exportation to England. The Portuguese vine-growers and wine merchants appear to have recognised the necessity of treating their products in a different way if they hoped to restore the old liking in this country for Port, such as it was before the days of sweetening, colouring, and excessive fortifying with spirit had begun. As a consequence of the change of practice in Portugal, and the production once more of a sound, generous, but not too dark or fiery a wine, the consumption of Port in England has quite recently increased in a remarkable manner. Doctors too, seem to have reconsidered their bad opinion of this wine as a favorer of gout, and now recommend a glass or two of good Port as one of the safest stimulants that can be taken, even where gouty symptoms are present.

Natural Port wine is, in reality, very far from a heady liquor, since it never contains more that from nine to a little over thirteen per cent., of alcohol, or about the same as the general run of the Medocs, Burgundies, Hocks, and Sherries. But Port with less than 34 per cent. of proof spirit in it, is liable to undergo a second fermentation and to deteriorate by acquiring an acid flavour, though with proper arrangements, Port wine at its natural strength can be made and preserved, as many of the present importations prove, and the wine thus constituted is a fine, dry, full bodied, full flavoured beverage, more like the finest Burgundy than like the made-up traditional hot, sweet Port, which was formerly so common. Natural, or but slightly fortified Port of this character has a most

agreeable perfume or *bouquet*, is of a tawny colour, and contains only about two thirds of the amount of alcohol present in the ordinary kinds; two or three per cent. of added spirit is now the usual limit, and less than this would probably not be compatible with the keeping quality of the wine. As regards the better class of Ports now coming into consumption, it may be said that whatever may be the alloy which the pure article receives after it passes the English Custom House, it is sold in Portugal pretty much as it comes from the press. Mr. Oswald Crawford, for many years English Consul in the Port-wine country, always denied privately and officially that the insinuation as to colouring with elderberries and logwood had any foundation in fact. On the contrary, this honest advocate of an honest wine affirmed that to the best of his knowledge and belief the man who at the present day drinks a glass of Port, drinks as nearly natural and as concentrated a form of fermented grape juice as it is humanly possible to set before him. Port wine, for the most part, contains so much colouring matter that it does not require the adventitious aid of elderberries, and, as a matter of pounds, shillings and pence, grapes in Portugal are much cheaper than elderberries in Surrey. Hence, whatever might have been the practice when the rage for dark, luscious Ports drove the merchants into evil ways, it is all but certain that any such temptation to mix a cheap fluid with a more costly one is unknown either in London or Oporto. In truth, there is nothing in Alto-Douro much cheaper than Port wine, since, in the vineyards, the sound, strong, though perhaps not very pure wine, such as the clay soils of the Verdeilho, the

Mourisco, or the Bastardo nurture, but vastly superior to the terrible productions of the Entre Douro e Minho districts, can be readily bought for threepence per quart, and, if something less expensive is required, Spain is ready to supply it at a figure still lower. It is clear that if people will make a wise choice, perfectly good Port can be purchased for a price at which it has been hitherto regarded as unapproachable, though, of course, fine old matured '11, '15, '34, '40, '47, '53, '63, and even '70, are not to be ransomed from the vaults in which they lie in bondage, for anything like the number of shillings for which a most excellent beverage can be had by the man fortunate in having a wine merchant in whom he can trust.

The official returns show that the present import of Port into England rather exceeds three million gallons a year, or about one fifth part of the total quantity received from all wine-producing countries.

The *natural* strength of Port wine of the principal districts, is shown in the following table.

Name of Wine.	District.	Strength of Natural Wine.		
Port.....	Evidoza	24·6	per cent.	proof spirit.
Port.....	Corvas	22·0	,,	,,
Port.....	Valencia	21·4	,,	,,
Port.....	Pezo.....	23·3	,,	,,
Port.....	Villa Nova ...	25·9	,,	,,
Port.....	Douro	23·9	,,	,,
Port.....	Douro	27·3	,,	,,
Figuera	Beira	20·8	,,	,,
Figuera	Beirada	22·6	,,	,,

Chapter Fifth.

WINES OF GERMANY.

Wines of the Rhine—Moselle and Maine—Beauty of the Vine Scenery—Rheingau District and Johannisberg Wine—Hock and Moselle—Sparkling Rhine and Moselle Wines—Bavarian Wines.

THE wines of Germany imported into this country are produced principally on the banks of the Rhine, the Maine, and Moselle, and nowhere are the vines cultivated with more care or skill. A fondness for vine cultivation exists among all classes, and every labourer or peasant possesses some small portion of vineyard. In the manufacture of the wines, especial attention is paid, not only to having the grapes perfectly ripe, but to keeping each variety separate, those only of one portion of a vineyard being put together. It is seldom that the vintages on the Rhine are consecutively good, were it otherwise, the stock of fine wines would be larger, and their consumption less fluctuating.

The beauty of the vineyards on the hilly banks of the Rhine is never forgotten when once witnessed; nowhere are vines so thickly planted, or in such luxuriance. Every hillside that will carry the vine is turned to account; flat terraces of earthwork suitable for the growth of the plant are constructed with incredible

patience and labour along steep ranges, the soil being carried up in baskets to the highest point; where there is a favourable aspect, vines may be seen growing in places almost inaccessible.

Johannisberg.—The Rhine glories in the "Johannisberg," the choicest of all varieties of "Hock." The vineyard in which this is produced—belonging to the late Prince Metternich—is in the district of Rheingau, on the right bank of the Rhine, and produces not more than 15,000 gallons in favourable seasons. Johannisberg has a very delicate flavour and perfume, is free from marked acidity—the great drawback to most German wines; and the best may sometimes be purchased on the spot at about £1 per bottle, a price that keeps it from general use. Inferior sorts sell at from 3s. to 4s. per bottle.

Steinberg.—The wine nearest in excellence and value to the "Johannisberg" is the Steinberg. It is produced entirely from the Riessling grape, which is the most esteemed in Germany, although the Orleans variety is much prized. The latter is principally grown in the neighbourhood of Rudesheim, the wines of which contain 22·0 per cent. of proof spirit. Stein-wine is sold in peculiarly shaped, dumpy bottles, called locally Bocksbeutel.

Hochheimer.—Among the finest of the Rhenish wines is the Hochheimer, from the vineyards surrounding the town of Hochheim, on the banks of the Maine. From this town is derived the name of "Hock," which frequently stands in this country for most of the German wines. The Hochheimer Dorn Dechaney is particularly celebrated, and fetches very large prices.

On the left bank of the Rhine the wines of the Palatinate are grown; they are inferior in quality to those of other districts, but yet are agreeable. The produce of the Palatinate averages about 800,000 hectolitres (nearly 18 million gallons) wine.

Rhine wines generally, are characterised by a peculiar *bouquet*, the produce of the Riessling grape. About half the plants in the Rhine valley are of the Riessling variety, and it is probable that this wine is a native of the Rhine district. In the Palatinate the Riessling grape is frequently accompanied by the Traminer. The third variety frequently grown on the Rhine is the Sylvaner or Austrian. These three wines produce, the first kind, a highly flavoured, the second a full-bodied, the third a spirituous wine; in certain cases a mixture of these gives a wine of excellent quality. In Baden much wine is made from the Chasselos grape, there termed *Gutedel*. In Alsatia (Alsace), the wines are nearly all white; they are genuine though rough, and much used by the Swiss. The wines of Rhenish Hessia are similar to those of the Palatinate on one hand, and to those of the Rheingau on the other. The vineyard south of the Liebfrauen Kirche at Worms produces the "Liebfraumilch," a Riessling wine of considerable *bouquet*. The wines of the Maine are in general very acid, Stein wine and Leiste excepted. The Rheingau a district to the north of the Rhine between Hochheim and St. Goar produces the finest wines in Germany. The entire *Gau* district yields in good years about 20,000 butts of wine, or four sevenths of the total produce of Xeres in Spain.

Of all German wines, those longest known to us are the Moselle, the most renowned of which grow in the neighbourhood of Trêves. Without possessing the strength or aroma of Rhine wine, the best sorts of Moselle are clear and dry, with a light agreeable flavour, and will keep for ten or twelve years. In some seasons they acquire a slatey taste from the strata on which they grow, but they are always considered very wholesome.

"Sparkling Moselle," and also "Sparkling Hock," are principally manufactured from the wines of the Palatinate, which are inferior in quality to the Moselle. The former wine derives its peculiar flavour from an infusion of the elder flowers.

Of Bavarian wines, the best are Stein Reisslinger and Leister Reisslinger, produced in the neighbourhood of Wurzburg, under the palace of which town are the vast cellars of the King of Bavaria, containing an immense stock of all the most choice wines of Germany.

The white wines of the Rhine are distinguished for never containing added spirit, they are never plastered or boiled, and are in these respects equal to the best products of the Gironde (Bordeaux). For the same reason they are wholesome to drink, producing none of the inconveniences of the brandied wines of Xeres and Oporto.

Chapter Sixth.

WINES OF AUSTRIA AND HUNGARY.

Austria and Hungary as Wine-producing Countries—Causes preventing the proper Development of the Wine Trade—Value of Wine Production and Exports—Hungarian Wines compared with those of France, Germany, and Spain—District of Tokay. Essence and Wine of that Name—Bordeaux and Port imitated by Vienna Merchants—Vine disease in Hungary—Adulteration of Wines—Hungarian Wines not injured by Sea Voyage.

AUSTRIA, including Hungary, is as a wine-producing country of Europe, second in rank only to France, and it has been asserted by competent authorities, that if the cultivation of the vine were actively and intelligently pursued in Hungary, Austria would surpass France in this important branch of commerce.

There are many reasons, however, for believing that France will always maintain her pre-eminence, as the wine trade is nowhere less advanced or the method of treating wines in the cellar more defective than in Austria; besides which the usury laws and a crude system of credit retards in particular its development in that country. Another, although it may appear not so important, drawback is the necessity of importing bottles from other countries, the glass manufactories of Bohemia being almost exclusively

engaged in the manufacture of the finer sorts of crystal. The producers of common glass, who heat their furnaces with wood, cannot compete with manufacturers in countries where coal is abundant.

According to Austrian statistics, the wine production of the country is valued at £4,000,000, and the quantity exported at £300,000.

Switzerland, Poland, Russia, Turkey, and Prussia take two-thirds of the quantity exported, the remaining third finding its way to England and other countries, *viâ* Trieste.

Some few of the Austrian wines can bear comparison with all but the very best French, Rhine, and Spanish wines.

Hungarian Wines.—The wines of Hungary have long enjoyed a well-merited fame, and the greatest future is probably reserved for that country, on the slopes of whose fertile hill the vine attains the utmost perfection.

The district which produces the most celebrated of all the Hungarian wines is situated near the town of Tokay, from which the wine derives its name. It extends over an area of at least 20 English square miles, and throughout this district the grapes are large and of a rich luscious taste.

The vines are reared on poles, and the vintage commences about the middle of October, by which time the grapes are not only perfectly ripe, but partially shrivelled up to raisins. The gathering is most carefully performed, so much so indeed, that the grapes may be said to be picked one by one. They are then placed on a grooved table, or into a cask, the bottom of which is perforated, and the juice which runs from them, through their own

pressure is the much-prized and costly "essence of Tokay." The grapes are afterwards trodden in a vat, and a small quantity of essence added to the must, which, after standing a few hours, is allowed to ferment slightly, after which the liquor is strained into casks, and becomes the celebrated wine of Tokay.

At one time, only a certain quantity of Tokay wine was allowed to be made, and that in a limited district, but this restriction has long since been removed, and as almost all the proprietors of vineyards in the neighbourhood of Tokay are consumers of their own produce, but little of the Imperial (sweet) Tokay is left for commerce.

The essence of Tokay resembles the syrups of the south of France, and is, from the limited quantity made, enormously dear; even at Vienna the Tokay wine sells at £12 a dozen; and at that price is not easily obtained. Old Imperial Tokay contains so much grape sugar that it not unfrequently forms a sediment of crystals in the bottles.

There is almost an exact counterpart to Tokay in the Rota (*Tintilla de Rota*, See page 54). This Tintilla is also mere juice of raisins and boiled must, and is not allowed to ferment, or develop alcohol; occasionally, however, it does ferment slowly to a slight extent, and forms up to 12 per cent. proof spirit. Of late, both Tokay and Rota are charged artificially with spirit, and have thus lost their original use and character.

During the ravages of the *oidium*, Hungarian wines found a good market, for while the vines of every other country were destroyed by its fatal effects those of Hungary almost entirely escaped.

Hungarian wines, although sometimes sold as the finest Bordeaux, are not equal in quality to French wines even of the second order; but we must not reproach the French for any want of discrimination, when we find it recorded on good authority, that a wine merchant in Vienna used at one time to send large quantities of imitated Port wine to England, *viâ* Hamburg, which even a connoisseur could scarcely distinguish from real Port. Carlowitz and Erlan, but especially the former, are now the best known and most largely consumed of all Hungarian wines in England. They are rather stouter than ordinary claret, and have a peculiar, somewhat earthy flavour, which requires some time for the palate to become accustomed to and to like.

Adulteration of wines is carried on to a great extent in Austria, and noxious ingredients are not unfrequently mixed with unripe grapes, &c., to produce what resembles and is afterwards sold as wine. This system is not only detrimental to the character of the wines represented by the compound, but is hurtful to the health of the consumer.

Austrian wines are celebrated for bearing a long sea voyage without injury, and in 1858 a Vienna merchant produced, at an agricultural exhibition there, wine in perfect condition that had been sent to New York and back.

Tyrol, Styria, Dalmatia, and Croatia, countries bordering on Austria and Hungary, produces much wine, but owing to its rough, poor character, it finds no consumption out of the localities. The wines of Istria and Görtz are grown much like the Italian vines, high in air; their product is of poor quality.

Chapter Seventh.

WINES OF ITALY.

Soil and Climate favourable for the production of good Wine, but Cultivation and Vintage neglected—Importation of Italian Wines—Vine Disease, and its effect on Consumption—Wines of Tuscany, Sicily, and Naples—Consumption of Sicilian Wines.

The Kingdom of Italy, as now constituted, furnishes us with a few good wines, such as the "Marsala" of Sicily, the "Lachryma Christi" of Naples, etc.; but considering how congenial are her climate and soil for the cultivation of the vine, it cannot but be regretted that Italian wines generally are inferior to those of France, simply from the want of care and skill in their production.

Not many years since, England imported little or no Italian wine, except Sicilian (Marsala); but owing to the change of duty in 1862 a stimulus was given to wine growers of almost every nation, and we find that at present Italy sends us nearly three quarters of a million gallons of wines of all kind per year. To continue this rate of importation with anything like a chance of success against French wines, the vine produce must increase in value in the eyes of Italian growers, and not be considered subsidiary to other crops, which has been the case for many

years. Previous to the vine disease, the wine was so abundant in Sardinia that it was the common beverage of the peasantry, by whom it could be purchased at twopence per litre (more than a reputed bottle); but such was the havoc the *oidium* made there in 1851, the effects of which are now only disappearing, that the labouring classes were deprived of wine, and had to resort to beer, the brewing of which received a great impulse by the increased price of wines, so that no less than 1,000,000 gallons of beer have been consumed annually for the last few years in the city of Turin alone.

Italy may be said to be covered with vineyards. In some parts, corn and vegetables are grown between the rows of the vines; in other places the vines are suffered to go unpruned, and in Naples and Sicily alone is there anything like proper attention paid to the vine and vintage. Tuscany, perhaps, is advancing year by year, and the produce of her luxuriant vines more cared for; but even there the treatment requires to be greatly improved, and it is only the landowners and nobles who take any pride in producing really excellent wines.

The finest Italian wines are those produced in Tuscany; the red muscat grape is largely grown at Monte Pulciano, between Sienna and Rome, and at other places. This wine is liqueur-like, of a purple colour, and slightly astringent. A good red wine is made at *Chianti* near Sienna from a peculiar grape. The nobles of Florence like those of Vienna sell their wines retail from their palace cellars, in flasks of the same shape as the well known oil flasks, but containing about three quarts each. These bottles are not stoppered; the wine is covered

with a small quantity of oil, which is removed before pouring out. In Lombardy and Venetia the wines are for the most part common and unfit for exportation. Piedmont produces wines called Chaumont, Grignolino and Aste (Vini d' Asti), the latter of which is usually manufactured to resemble Champagne, but beyond the effervescence there is no likeness between the two. Central Italy produces the wine of Orvieto, and the syrupy muscats of Albani, and Montifiascone of the south Italian wines; those produced in the neighbourhood of Naples are the only ones possessing quality. On the whole it must be said that Italian wines are badly ground, badly made, and strongly flavoured with resins and extracts. But Sicilian wines, which are reared by English enterprise, and remarkable for excellence and cheapness.

Marsala.—Only one variety of Sicilian wine is exported in anything like large quantities—the light brown or amber wine which goes under the name of the town from which it is shipped—Marsala; this place is situated near the western end of the north east coast of Sicily. The vineyards extend along the coast towards the east and west over an area of upwards of 20 square miles in length by 12 in breadth. The soil is a chalky clay. There are many varieties of vines, and the grapes are all of inferior quality; all the wine shipped from Marsala to England is strongly brandied. Much of it is sold under its proper name of Marsala, but large quantities are mixed off, and sold as Sherry. The total produce of wine in Sicily is not known; less than 300,000 gallons of it are consumed in England.

Of the wines produced in Sicily, "Marsala," "Faro," and "Terre Forte" are the best; the latter, principally

grown in vineyards belonging to the Benedictine Monks in the neighbourhood of Mount Etna, containing 30·0 per cent. of alcohol, while the Faro wine, grown in the neighbourhood of Messina, contains upwards of 22·0 per cent. of spirit.

The best Neapolitan wine is Lachryma Christi, the produce of vines grown at the bottom of Mount Vesuvius. It is a red wine—sweet and luscious, with an excellent flavour. The Gallipoli and Taranto wines are much stronger than Lachryma Christi, but are not nearly equal in richness.

The wines of the Roman States are, with few exceptions, very common ; Albano and white and red Genzano being among the best.

Chapter Eighth.

WINES OF GREECE AND THE ADJOINING ISLANDS

Soil, Climate, and Fruit favourable to the production of good Wine—Product spoiled by bad management—Wines of the Ionian Islands.

HAD we omitted any mention of the wines of this country, beyond the few remarks made in the first chapter, the readers to whom we address ourselves—practical wine merchants—would not have found that the omission at all affected the usefulness of the present work. However interesting it might be to a student of history to read of the production of that wine—Malmsey—in which a Clarence was drowned, the merchant would obtain no advantage in becoming familiar with what, in the time of Henry VII., sold for 2d. a quart, and at the present time is almost unknown.

It will here be sufficient as regards the wines of Greece to say generally that both the kingdom of Greece and the Greek islands of the Mediterranean are very favourably situated, and the soil well adapted for the production of wine, but these natural advantages are turned to only very slight account. At one time, during the Venetian supremacy, wine was largely made in Greece, but the total now produced having any merchantable quality is

almost insignificant. Most of the vines are cultivated for the growing of currants; this of course hinders the manufacture of wine. The most important of the Greek islands is perhaps *Santorin*; there are also Greco, Cipro, and numerous other wines of inferior quality, all of which are for the most part used in the localities, or exported to the east, and a little also of late years to France. The grape-juice itself is often good enough, but, the wine from it is spoiled by bad management. It is a matter of fact, that the so-called notorious Hambro' or Elbe Sherry is prepared from Greek wines, dry and sweet; these are exported by a German company from Patras in English ships to Hamburgh, and there mixed with potato-spirit. In one respect this coloured and flavoured compound is superior to ordinary Sherry—it is not *plastered*, but it ranks only with the lowest Sherries in price, as it possesses very little true vinous character.

The wines of *Cyprus* are of two kinds, the fermented, and the liqueur-like. The so-called Commandery wine is made near Paphos in the district of Orrio; the process of manufacture is curious, the juice is fermented and matured in a series of earthenware vessels, about 40,000 in number, of the ancient *amphora* shape, that is like a very broad pitcher, each holding from 10 to 12 litres (17 to 21 pints). This wine is of a dull colour originally, and becomes tawny by age; it is rather sweet, with an astringent after-taste, and a peculiar almond-like flavour which is supposed to be given to it by an addition of spices. The bulk of the wine is consumed at Venice and Liverne. An attempt has been made of late years, and not without some success, by Mr. Denman, wine merchant of

London, to popularise Greek wines in this country; the best kinds are light, pleasant, and refreshing, without being too alcoholic, and are often recommended by medical men for the use of invalids; the price, as compared with that of good Claret, is the only drawback to their greater consumption.

The Ionian Islands, now belonging to Great Britain, produce several sorts of wine, the most of which are strong, Zante wines being, perhaps, the most esteemed. The production is about 8,000 casks annually.

Chapter Ninth.

WINES OF MADEIRA AND OTHER ATLANTIC ISLANDS.

Description of the Island of Madeira—Its wine-producing capacities—System of vine culture pursued—Varieties of Madeira—Cause of the destruction of the Vines in 1852—Oidium—Phylloxera—The Blandy wines—Character and qualities of Madeira—Gran Canary and Teneriffe, the two principal Islands of the Canaries—Canary Sack—Vines introduced from Germany and Candia—Teneriffe inferior to Madeira—Decrease in Quantity yearly imported into Britain—Teneriffe and Malmsey grown on Palma—Wines of the Azores.

MADEIRA * has rightly been called the "Pearl of the Atlantic." The beauty of its scenery, as one approaches the island, is almost unequalled. Barren, volcanic rocks, capped with rich pines, stand out in striking contrast to a luxuriance of tropical plants and trellised vineyards discernible on the mountain slopes. So forcibly does this grandeur assert itself, that once seen it can never be effaced from the memory. And the interior of the island is as beautiful as the view of it from the sea leads one to expect.

* Most of the account here given of Madeira and its wines, is taken from an excellent publication of recent date, "The Wine and Spirit Trade Combined Circular."

Apart from the picturesque, a very great attraction to invalids is the unvarying temperature of the island, which ranges from about 64 deg. to 75 deg. Were its charms better known, Madeira, within easy range of England as it is, would become more than ever a favoured resort. The population consists mainly of poor, simple, ignorant folk, entirely subservient to the powers that be, and numbers about 100,000 souls. Of these about 500 only are English residents and visitors. It is a curious fact that, with a most exuberant vegetation, there is a marvellous absence of animal life—a deprivation which, under such exceptional advantages of climate, the authorities could easily remedy by importation, had they but a slight spirit of enterprise.

Carriages are never used in Madeira; indeed the steep roads, paved with rounded stones, would render their use impossible. The means of conveyance are as novel as they are luxurious. When ascending the hills one is carried in a hammock borne by two natives, luggage being transported in a vehicle drawn by oxen. The descent is made in "carros," or sledges, guided by men, which at times attain the speed of twenty miles an hour.

Funchal, the capital, boasts some good hotels, a club, a cemetery, and a church, all English. It has but few shops, and no theatre. The kindly disposition of its residents, and their pleasant sociability, render a visit to Madeira more than agreeable, and it has been said with truth that nowhere out of England can an Englishman feel more at home.

Wine has always been the chief product of Madeira, for which England and her colonies used to be the principal

markets; but now, owing to causes with which we will deal presently, the consumption of Madeira wines is nothing compared to what it was; and, moreover, the greatest ignorance prevails concerning them. Let us, then, follow briefly their history from the beginning, and note why they went out of fashion, and why they are slowly, but surely, regaining their old position in popular favour.

Vines are stated to have been planted in the island so long as 400 years ago, but we have it on undoubted authority that at the end of the seventeenth century vine culture was carried on by English merchants, and that the wines became well-known in England about that time.

The commencement of the present century may be taken as the most flourishing era in the wine-growing annals, for a very large part of the island was then under cultivation of the vine, and the production reached 30,000 pipes. The largest exports ever made were in the year 1813, when the shipments are said to have amounted to over 22,000 pipes. For many years subsequently the shipments were large, but irregular, till they declined to 6,690 pipes in that fatal year, 1852, when the blight known as "oïdium tuckeri" so devastated the vines that they had all to be rooted up.

From this point, shipments gradually continued to decline, till, in 1865, only 636 pipes were exported. By that time, however, the new vines which had been planted were getting in good bearing order, and, as production increased, exports became heavier, so that in 1882 they had again attained to 4,260 pipes. Since then they have been gradually improving.

The system of vine culture in Madeira differs from that of most wine-growing countries. There are no large vineyards, the vines being grown by small holders, or farmers, over a cane lattice-work a few feet from the ground, called the "latada." It is customary for the merchants to buy the produce of a vineyard while the grapes are still on the vines, instead of waiting till they are converted into "must"; but they depute a responsible agent to see that picking does not commence till the right moment, and to supervise the work up to the time of the delivery of the "must" into their cellars.

After being picked, the grapes are thrown into a press standing in the vineyard, and are there trodden by barefooted natives, who indulge in all sorts of wild and fantastic capers. The "must" is then carried down from the hills by men called "Boracheiros," in goat skins, from which they empty it into casks in the shipper's stores. Here it remains undisturbed until after fermentation has taken place, when about three per cent. of brandy is added.

The wines now require careful attention and judicious racking and fining. They are rarely shipped until three years old.

The grapes from the south side of the island yield the best wines. Those from the north are used for the commoner descriptions.

Vintage Madeiras are but seldom sent out, as it has been found that by careful blending with older wines a finer and more pleasing flavour is obtained. Each vintage possesses peculiar characteristics, appreciable only by those who have acquired a taste for them.

There are three distinct types of Madeiras which are most highly considered, and which represent the choicest growths. These are the "Boal," a rich generous wine, with splendid bouquet, approaching as nearly to perfection as a wine can; the "Sercial," which is the driest style of Madeira, very delicate, and with a flavour exclusively its own; and the "Malmsey," an exquisite sweet wine, almost a liqueur in character. This "Malmsey," or "Malvoisie," used to be a great favourite; and as showing how old is the reputation it bears, we may perhaps be allowed to refer to the quaint epithet which Falstaff applied to Bardolph when he called him an "arrant Malmsey-nosed knave."

Other well-known marks are the "London Particular," which, as a real good wine of fine quality at a moderate cost, has been celebrated in England ever since 1795; and the "Cama de Lobos" wines, which derive their name from the district so called. It is upon the fine mountain of Cama de Lobos, with its vine-clad slopes, that the very choicest Madeira grapes are grown, and the vine flourishes there at a greater altitude than probably anywhere in the world.

Very large parcels of Madeiras were at one time sent on a voyage to the East and West Indies, with a view to hastening their maturity through the heat to which they were subjected in the ship's hold. It is astonishing what softness and fine flavour they derived from the trip. In a small way the custom still prevails, as also does the old fashion of exposing wine to the heat of the sun on the housetops.

The old Bengal Artillery corps was famous for its

Madeira; and it was mainly owing to the recommendation of officers who had tested the wine in the Indies that it found such favour in England, and became, what once it undoubtedly was, the most popular and fashionable of all wines. Having then once been so firmly established, how came Madeira to lose its position in the chief markets of the world?

The primary cause was the terrible destruction of the vines in 1852 by the "oïdium tuckeri" to which we have already alluded, and the consequent check to trade; for it took the new vines which were planted thirteen years to attain to full strength and fertility. As production ceased, and stocks became exhausted, prices rose to such an extent as to put Madeiras beyond the reach of all but the very wealthy, and wine drinkers were consequently obliged to resort to Sherries and Marsalas which George IV., it is stated, had vainly tried to introduce as a substitute.

A position once lost is difficult to recover, particularly when fresh attacks come from unlooked-for quarters just as headway is being made. This has been the case with Madeira wines, whose return to favour received many severe checks. Of these we may mention the opening of the Suez Canal, which, by presenting a more favourable route, caused eastward-bound ships to cease calling at the island; the manufacture on the Continent of much spurious "Madeira," which, by misleading the public, created a prejudice against the genuine wine; and, notably, the attack on the vines by the *phylloxera* in 1873. The phylloxera has acquired a terrible name, owing to the extensive damage it has wrought to the

vineyards on the Continent; therefore, it is desirable that we should at once remove the existing false impression that the scourge is still prevalent in Madeira. The phylloxera was a matter of vital importance to the inhabitants of the island; and a conference held by them led to the appointment of a special commission to ascertain what vines and seeds were best able to resist the attacks of the insect. This resulted in the importation of American vine stocks, which have proved impervious to the pest, and have practically overcome it.

We have dealt with the reputation Madeiras used to bear; however, they were forced out of fashion; and how, through misfortune, they were so long kept out of it. We shall now have to consider why they are coming in again, and what special inducements they offer to the consumer.

It should first be noticed that Madeira is being more extensively drunk now because the public is just beginning to find out its true value and quality. This enlightenment is due chiefly to the great efforts made by the shippers of late years in advertising the wines, and, in a lesser degree, to the wine merchants, who have seconded those efforts.

The enormous stock of celebrated Wines held by Messrs. Blandy Brothers & Co. is a matter of notoriety, and a few words about the "Blandy Madeiras" will not be, perhaps, out of place.

The firm, which dates back as far as 1811, gradually acquired a large banking and general shipping business; it has also now held for many years the agencies of the Castle Packet, the Union, the British and African, and

many other lines of steamers. It supplies, moreover, with coal all the shipping that touches at the island. The late Mr. Charles R. Blandy, having his hands full of other business, did not give much attention to the wine trade until the disastrous "oidium" year, 1852, when, wise in his generation, he bought up all the old stocks that he could obtain, feeling certain that sooner or later the wines would recover their position, and a demand be created.

The ancient cellars in which some of the "Blandy" wines are stored are curiously described in the following, which is worth reproduction :—

"A long dim apartment, lighted by iron-barred square windows, having ranges of huge antique-looking butts, branded with the names of famous Madeira firms now defunct, whose stocks are still thus preserved. Each of the butts, holding about 650 gallons, contained wine of rare flavour and aroma. To secure room, Mr. Blandy acquired the contiguous old theatre of Funchal; and a series of arches lead into a succession of courtyards, girt round with buildings filled with pipes upon pipes of wine. The establishment is on a very large scale, for the space required for the accommodation is enormous. Even on an island so small, the growths vary much."

For nearly a quarter of a century the Island of Madeira has enjoyed a continuity of perfect vintages, and as the consumption has been small, stocks have accumulated, and prices have fallen considerably. The soil of the island contains every essential for the perfection of wine growing; it is absolutely singular in this respect, and, at the slightest encouragement, farmers who are now grow-

ing the sugar cane will at once re-plant vines; production would then attain as large proportions as have ever been known.

The Madeira grapes abound in saccharine, and the wine is shipped at an average strength of about 32 degrees proof spirit. They are really honest wines, full of vinosity and natural salts, and are recommended by the faculty as being most beneficial to persons suffering from dyspepsia, in whom Sherry so often creates acidity. They, moreover, boast a special character, for they unite high flavour with softness, and possess altogether exceptional keeping powers, a quality which makes them peculiarly adapted to the climates of the colonies.

In the early part of this century there was an enormous consumption of Madeira in the East and West Indies, while it once occupied the leading position among wines in England and America, where it was to be found on every dinner table.

History will always repeat itself, and we venture to predict that such will be the case with the popular taste for these wines. They are no doubt among the richest and choicest wines in the market.

The "Canaries" situate in the Atlantic Ocean, off the north-west coast of Africa, are a group of seven islands, which have, since the beginning of the 15th century, been attached to the Spanish crown. The principal ones are the Gran Canary and Teneriffe, sometimes called Vidonia, a name derived from that of the principal grape, the Vidogne or Vidogna, and from these islands was

exported the Canary Sack which, 200 years ago, found so much favour with our forefathers.*

It is said that the vines planted in the Canaries were introduced from Germany, and that the change of soil and climate produced what has ever since been denominated Canary wine. Whether such is the case or not it is difficult to decide, but Malmsey wine is certainly not thus to be accounted for, as it is the produce of vines introduced from Candia, one of the Mediterranean islands.

The wines of the Canaries, also known under the general designation as Teneriffe, resemble Madeira, though far from possessing its flavour or body. This difference has been ascribed to want of care in the management of the vintage, but whatever is the cause, it has no doubt assisted in reducing their importation into Britain. In 1827 the quantity of Canary wines sent to this country was 417,703 gallons, but that was the largest quantity ever imported, and from that date to the present time the annual returns have shown such large decreases that in a few years they will in all probability cease to be consumed, except when sold by a certain class of wine merchants as "Madeira."

The dry Canary wine known as Vidonia has a good body and improves with age. It is made from grapes gathered before they are ripened, and when new it is far from pleasant; but a few years soon removes

* "Sack" or sect, is said to have been the sweet wine of these islands, *vino secco*, or *seccato*, so called because it was made from grapes which had been *dried* to a certain extent before making into wine.

this flavour and greatly increases its mildness. This wine is also grown on the volcanic soil of the island of Palma, but is inferior to that of Teneriffe. The Malmsey, or Malvasia, of both these last-named islands, is very excellent, although possessing, as some affirm, an acid quality.

The *Azores* produced at one time about 5,000 pipes of wine annually, but the present yield is very small. Most of this wine and indeed of the Canary wine is vatted with Sherry and sold under that name.

Chapter Tenth.

WINES OF AFRICA.

Ancient African Wines—Constantia—Cape Wines—First Cultivators of the Vine—Soil—Treatment—Dutch Obstinacy—Duty—Quantity imported into Britain.

ALTHOUGH Africa produces wines in various parts, the South African wines, formerly known as Cape, are now the only produce of the continent which it is necessary to describe. The ancients were loud in their praise of the once celebrated *Mareotic* wine, but the Mahomedan rule has banished this and almost every other kind of wine from Egypt.

When the Dutch settled at the Cape they commenced cultivating the vine, but owing to mismanagement the first plantations were not successful; nor can this be wondered at, for although the climate is extremely favourable to vegetation, the soil which has so much influence on the quality of the fruit is in some places unsuitable; yet the Dutch never took the trouble to consider what would be the best site for a vineyard, and it was not until the French settled at Franschehoek that the vine was properly cultivated.

In many parts of the Cape the soil is well fitted for

the production of wines, but in other parts the subsoil consists of sandy loam, containing alluvial clay resembling silt, which gives to the produce of the vine an earthy taste.

Constantia.—At the bottom of Table Mountain, where the soil is stony, are the celebrated vineyards of Constantia, formed by Vander Stel, a Dutch Governor, and named after his wife. They consist of the Upper and Lower Constantia, both of which produce red and white liqueur wines exempt from any disagreeable taste and of great richness. The grapes used are transplanted from those which produce the muscat of Frontignan. This wine, however, bears but a very small proportion to the produce of the other South African wines, and in the most favourable seasons does not exceed 100 pipes.

The plants to be found in the Cape vineyards were all originally imported from the banks of the Rhine, although it is said that those first introduced were from Persia. The South African wines are made from transplants of the Burgundy and Riessling grapes, and with the exception of Constantia, are all fully fermented wines of moderate body.

The vines are planted in rows, a few feet apart, and in most instances cultivated without props, having their branches interwoven similar to the low vines in certain parts of France. The object of keeping the vines low is not so much to enhance the quality of the produce as to protect them from the strong south-east wind which blows during the summer with great violence.

The ground is generally tilled and manured in October, the vines having been previously pruned in August. In

March the vintage commences. This operation is generally left to the care of emancipated slaves, who frequently gather the grapes before they are ripe and never think of sorting or picking the ripe from the unripe fruit. Stalks, stems, and any earth clinging to them, all go into the vat together, and help to make detestable a large proportion of the wines that would otherwise be good, for the fruit is generally rich and fine and free from any earthy taste. The fermentation cannot be said to be carried on less rudely, nor are the casks in which the wine is racked better attended to; indeed, the peculiar disposition of the Dutch could not be more fully displayed than in their indifference to the character of their wines.

This want of care in the vintage and preparation of Cape wines is not shown in the case of Constantia, which is carefully made from the best selected grapes.

The wines of the Cape frequently become sour after fermentation is completed, unless a portion of brandy distilled from the refuse of the grape is added. Sometimes rum is employed for this purpose, and is much to be preferred as it is more pure than the native brandy. The farmers are prohibited from sending their new wines into Cape Town till the month of September succeeding the vintage; and a heavy duty is charged upon all wines entering the capital for consumption.

In addition to the Constantia there are the Whittleboom, Stellenbosch, Roben, and Perle, all sweet good wines when properly cared and matured.

In 1812 the duty on Cape wine imported into this country was 9s. per gallon, the same as on Port and Sherry; but the following year the duty was reduced to 3s.

without any reduction on the wines of other countries. In 1825 the duty was again lowered to 2s. 5d.; but in 1831 it was increased to 2s. 9d.; and again in 1840 to 2s. 11d. In 1860 it was made equal to the duties payable on other wines.

Cape wines when paying only half-duty destroyed all competition, and a large proportion of them were used to mix with, and falsify the products of other countries, the compound being sold as cheap sherry. Not unfrequently Cape wine was added to Sherry entered for exportation, and drawback claimed as if the whole were wine on which the high duty had been paid.

Chapter Eleventh.

WINES OF AMERICA AND CALIFORNIA.

Increased Vine Culture in America—Celebrated Vineyards—Cincinnati and its Produce—The Catawba Vine—Mode of Cultivation—Production of Wine before the War—Extent of Country available for Vine Culture—Congenial Vine Soil of California—Quality—Exportation.

For the last half century the culture of the vine has been very rapidly extended and improved in America, so much so indeed that in at least two-thirds of the States, vineyards of more or less promise have been planted.

The most celebrated and extensive vineyards are those in Ohio, Missouri, and Indiana; while in Kentucky, Illinois, Georgia, North and South Carolina, Maryland, Pennsylvania, and even the State of New York, a rapid increase in the number of acres under vine cultivation is apparent.

The banks of the river Ohio are beautifully studded with vineyards, but no particular advantage is thought to be derived—as in Europe—from the vicinity of a river, and most of the vineyards of America are scattered about at considerable distances from any water.

In the immediate vicinity of Cincinnati, the commercial

capital of Ohio, and the centre of vine-culture generally in America, several thousand acres are devoted to the cultivation of the vine, and here is produced the celebrated Catawba, made from black grapes, which somewhat resembles Rhenish wine in colour and appearance, but has a characteristic musky flavour not agreeable to most persons when the wine is first tasted.

In Ohio and Missouri this wine is much relished and sells at exorbitant prices, 4s. and upwards per bottle being charged for "Sparkling Catawba," which is said to equal good Champagne in quality. Besides the Catawba, the most remarkable vines of the states are the Cape grape, the Isabella, Bland's Madeira, Ohio or Segar-box grape, Lenoir, Missouri, Norton's Seedling, the Delaware, and the Scoppernong.

The Catawba vine is the most celebrated and prolific in the States, but so liable to injury by rot and mildew—the principal diseases—that the yield is very uncertain and a hardier species is much required. Of the various other native vines above mentioned, "Norton's Virginia Seedling" and the "Delaware" are the most promising, and will, it is expected, at no distant period supersede the Catawba.

The general method of culture is to trench the ground 1½ to 2 feet deep with the spade and plant from 1,000 to 1,500 cuttings to the acre. The vines are trained on trellises or fastened to stakes 5 or 6 feet in height. For the first three years the vine is pruned down so as to leave but a few eyes; and the vineyard is kept as free as possible from grass and weeds.

The grapes after being picked are subjected to the

same process as in Europe; and in making the sparkling Catawba the method is as complicated, and the care used asgreat as in France, to make the much-prized Champagne.

There is no doubt that the culture of the vine in the United States will rapidly extend, and wine can be produced as abundantly as in Europe, for—to say nothing of the thousands of acres of land in the Carolinas and Georgia unfit for raising cotton or corn, but which might readily be converted into vineyards—there is in Missouri alone a larger area available for vine culture than that of all France.

California has a soil well suited for producing good wine, and nowhere can the vine be seen growing to greater perfection or yielding greater abundance. In 1868, one district alone produced a quarter of a million of gallons of wine of various qualities; and such is the increase of vine culture that new and large districts are yearly planted. The wines produced near Angelos will bear a comparison with those of Europe, and indeed a large quantity is yearly exported to Germany and France.

No kind of American wine is as yet an article of regular import into England.

Chapter Twelfth.

WINES OF AUSTRALIA.

Soil and Climate of Australia—Gradual extension of Vine-culture—Finest Vineyards—General character and strength of Australian Wines—Improvement of quality desirable.

ALTHOUGH the soil and climate of Australia have been frequently represented as ill-adapted for the culture of the vine, yet the manufacture of wine now constitutes an important branch of colonial industry, so that each succeeding vintage is looked forward to with great interest, as it is hoped that at no very distant period, when the land is more thickly peopled and labour less costly, the cultivation of the vine may be profitably pursued, and wines produced in quantity and quality that will fairly compete with those of Europe.

Vine culture was begun in Australia in the year 1830. It is said that most of the wine makers in the country are gentlemen of property who are desirous of producing good wines, rather than of obtaining large or immediate profit. The result of this interest taken in the subject by a few respectable growers must be to establish the reputation of the wines, and render their production permanent and remunerative. New South Wales, Australia and Victoria, all produce wines which are for

the most part, fully fermented, some are a little brandied, and some prepared as liqueur wines.

The finest vineyards are perhaps those at Beechwood and Albury, in the neighbourhood of the Murray River; at Dalwood, in New South Wales, there is also a flourishing vineyard, which extends over 70 acres, and yields a large produce of sound, palatable wine.

The character of this wine ranges from light to medium, and full bodied; average strength 20 to 24 per cent. of natural proof spirit; no fortifying is practised or needed. At present the produce of the Auldana vineyards is the best known of the various Australian wines in this country; although a wine called *Cwarra*, resembling a second-rate Rhine wine, is by many extolled as the finest of all Australian vine products. Fancy names, borrowed from favourite continental wines, such as Tintara, Hermitage, Chasselas, Riessling, &c., are given to these and other Australian wines according to the resemblance supposed to exist, or really existing. If Australian wine is ever to compete successfully with good cheap Clarets and Hocks in this country, a considerable improvement in flavour has still to take place.

Chapter Thirteenth.

WINES OF SWITZERLAND.

In Switzerland, as in Russia and several other countries not noticed in this work, the vine is cultivated, although not to an extent sufficient for the consumption of the people of the localities. The climate of Switzerland in general is too cold for the production of wine good enough to obtain the liking of people of other countries. It is only around Neuchâtel, on each side of the lake of Geneva, and also on the slopes of the hills between Culoz and Geneva, that vineyards are at all numerous. From the Valtellina district, however, a very sound and palatable wine, red and white, has lately made its way into England. This wine is cheap and compares well as to flavour and bouquet with the wines raised in the neighbouring Italian states.

As a rule the wines of Switzerland are deficient in spirit and characteristic bouquet, although when consumed locally, they are found refreshing and agreeable.

Chapter Fourteenth.

WINES OF ASIA, THE CRIMEA, &c.

Asia produces splendid grapes, and in some parts of its vast expanse, excellent wines—for instance at Schiraz, but none of these wines, as at present prepared, suit the European taste. The wines of Schiraz are sold by weight; they are highly-prized in Persia and all over the East. The wine districts of Persia best known to strangers are those of Teheran, Yezd, Shamaki, Gilan, and Ispahan. Tolerably good wine is said to be made in Chorasan.

On Mount Libanas, at Kesroan, good wines are produced; they are for the most part boiled. The price of Lebanan wine locally is very low.

In India and China small quantities of inferior wine are made; the consumption is wholly local.

Madagascar has native vines, but no wine is made from them, as they are considered by the inhabitants to bear a poisonous fruit.

In the Crimea a great deal of good wine is produced, partly on the Imperial Russian estates, partly in vineyards belonging to private persons or companies. The produce is wholly consumed in Russia.

Chapter Fifteenth.

ADULTERATION OF WINES.

Adulterations before and since the Reduction of Duty—Reports as to the Adulteration of Rhine, Hungarian, and Spanish Wines—Report of Commissioners of Customs as to Importation of Spurious Wines—Muspratt on Adulterations of Sherry and Port—List of the principal Adulterants—Detecting Adulterations—Spurious Wines avoided, by purchasing of respectable shippers—Instrument for ascertaining the Strength of Wine.

One of the principal arguments used by those who advocated a reduction of the former high duties on wine was, that when the cost price was thus lowered, the inducements to adulteration would be greatly lessened if not altogether removed; and this argument they illustrated by reference to the adulterations carried on in Paris and other large towns of France in consequence of the heavy duties there in force.

It might well be thought that this conclusion was sound, and that a more powerful argument could not have been employed, the manufacture of spurious wines, particularly Port and Sherry, being then carried on in England on a very large scale, not only to the injury of health, but of the revenue.

In February, 1860, the duty on foreign wine was reduced from 5s. $9\frac{3}{10}$d. to 3s. On the 1st January, 1861, it was further reduced, and in April, 1862, the present rates came into operation. What effect have these reductions of duty had on the adulteration of wine at home and in foreign countries? Certainly not what could be desired and was so confidently predicted—its entire removal.

From Reports on the strengths of wines of the principal wine countries, drawn up for the English government, by special commission, we quote the following passages:—

Rhine Wines.—"The growers pride themselves upon the purity of their wines, and from all the inquiries I have made I believe they do not practice mixing or adulteration; on the other hand, the dealers buy up the poorer wines, and by mixing them with others of better quality, and by the addition of spirit and chemical matter, seek to give to the wine the character of the better kinds, and thus increase their profits. Bingen, I was told, is a town notorious for such spurious manufacture."

Hungarian Wines.—"I was desirous to send samples of the celebrated Tokay wine, but was told on the highest local authority that this wine was in such repute that it was imitated in many places by the fictitious manufacture of inferior wines; that the spurious trade was carried on at Tokay itself; and that if I visited the place (more than 200 miles distant) I might very possibly spend a week there, and still be deceived by spurious specimens.

"The dealers at Pesth and Presburg buy up large

quantities of Hungarian wines, mix them with water and otherwise adulterate them to enhance their own profits; and there is reason to believe that a compound of this class is almost the only so-called Hungarian wine that has hitherto found its way to England, and that the pure wines of Hungary are really unknown to us. If imported direct from the growers, the better class of wines could not fail of a large sale in England, for it has been calculated that they could be sold in London at 4s. a gallon."

Spanish Wines.—"The wines of Valencia, Benicarlo, and Alicante, being rich in colour, are made up to simulate Port wine, and the casks are prepared to resemble Port pipes as to size and appearance."

These Reports were made nearly two years after the first, and one year after the second, lowering of the duty; and to prove that even now the sophistication of wine imported into this country is carried on abroad to as great an extent as formerly, we quote from a Report of the Commissioners of Customs to the Treasury, April, 1864."

"IMPORTATION OF SPURIOUS WINES.

"The importation of spurious wines into this country, principally from Hamburg, is a subject that has much engaged our attention during the past year, and has been fully explained to your lordships in several Reports.

"There can, we think, be no doubt that the practice—which of late years has extensively prevailed—of importing, under the guise and denomination of wine, an article containing a large percentage of spirit, but only a sufficient

quantity, if any, of the known constituents of genuine wine to disguise the compound by the imitation of colour and flavour, is one which imposes a duty of great responsibility and difficulty on our officers, and is at the same time prejudicial to the interests both of the fair trader and the Revenue.

"In order to check these spurious importations, and to protect alike the Crown and the public, we have been obliged to adopt one uniform plan of operations in every instance.

"In all cases of doubt samples are taken and subjected to a careful examination by our most experienced officers (consulting with impartial members of the trade in all cases of difficulty), and if any doubt then exists as to the quality of the article, the samples are forwarded to the Inland Revenue for chemical analysis. If the final decision is conclusive against the importer, the article is held to be liable to the duty due upon 'mixed spirits;' but if, on the other hand, the decision should be in his favour, it is considered as correctly entered, and is delivered as wine.

"This course has not only been expressly approved by your lordships, as fair both to the Crown and the importer, but it has, we hope, already succeeded in discouraging the importation of an article that has no pretence whatever to be considered as wine."

That the *importation* of compounds made to represent wines should be effectually checked is a matter of national importance, and perhaps the Customs authorities may eventually succeed in devising some practical means of attaining this end; but without some stringent enact-

ments, unprincipled dealers in this country, who carry on the manufacture of spurious wines as a regular branch of trade, cannot be detected or properly punished for an offence so injurious to the public health, and so great a fraud on the consumer.

There can be little doubt that a large proportion of the so-called Sherry served at the lower class of public houses is an article made up in this country, harmless enough perhaps in all but its rawness and fieriness. Port wine, says Dr. Sheridan Muspratt, is even more than Sherry the most easily and frequently imitated and adulterated of all ordinary wines. It is clear that wines of any given kind, if pure, will differ very little more in flavour in any season than may be occasioned by the strength or the weakness of the must. The main characteristics of the wine will always be present. In a first-class Burgundy wine, for example, it will always be possible to distinguish that the wine is the growth of the country assigned, and no other wines will be drunk in its place that are not of the same order. This would be the case with all sound, good growths, and with the wines of Oporto as well, had they not been continually deprived of their natural character by mingling, colouring, and brandy adulteration. A house—Ireland and Company, of Bristol—was renowned for its excellent Port wine, and a handsome fortune realised. All at once, on the breaking out of the French Revolutionary war, Bristol Ports were no longer to be had, and Ireland and Company wound up their affairs, because they could no longer obtain the wines of the South of France, for which they were celebrated as Port wine merchants, not a cask of their wines having ever

been in Portugal. Now such a deception could not be practised with Burgundy, Champagne, or the finer wines of France."

The most common fraud in the wine trade is the mixing together of different qualities, a good wine with a middling or a bad, or what is worse still, the entire substitution of a low class wine, after flavouring and other treatment, for a genuine wine, of superior quality and higher price. The Médoc wines or Clarets before being exported or sold are so largely blended with other inferior and stronger French wines, as to be sometimes increased to six times the original bulk. They are also dosed for the English market with much more spirit than is at all necessary for the preservation of the wine. Nothing short of the skill of an experienced wine-taster can detect to a certainty the first of these forms of adulteration. As regards the addition of spirit, a ready test is at hand in the small distilling apparatus described on page 6; at one time sugar of lead was put into wines to correct over acidity, but this dangerous practice is now given up, soda or potash being used instead, without injurious results. The traces of lead occasionally found in bottled wine are due to shot carelessly left behind after cleaning. In Spain, Sherry is commonly coloured by the addition of must boiled down to a fourth or less of its bulk, and in England by burnt sugar or spirit colouring; where Sherry is deficient in dryness and flavour, a little Amontillado is frequently employed to impart the desired qualities.

Several other ingredients, such as essential oil of almonds, bitter almonds themselves, cherry-laurel leaves,

cherry-laurel water, &c., &c., are also used for a similar purpose. In Portugal the juice of elderberries is sometimes added to Port wine to heighten its colour, and extract of rhatany to give astringency, but these practices are now very rarely resorted to, for reasons explained in another Chapter (see page 64).

Artificial Crust.—To cause Port wine to deposit a crust on the inside of the bottles, powdered catechu or finely powdered cream of tartar is put into each bottle before the final corking, and the whole well shaken up; sometimes also a crust is prepared and made to adhere to the sides of the bottle before filling it with wine by adding a hot concentrated solution of red tartar, thickened with gum and some powdered common tartar. All this, it should be understood, is done abroad by the makers or vintners. The use of jeropiga for mixing with Port at the time the wine is made up has already been described (see page 59).

In order to impart the much-prized golden yellow tint to Sherry and certain other white or light coloured wines, infusion or tincture of saffron is employed, while all shades of amber and fawn, or deep brown, are given by burnt sugar.

Imitating effects of Age.—As one of the best known effects of age is to deprive wine of most of its colour (old tawny Port for example) by gradual precipitation of the natural colouring matter, fraudulent dealers take advantage of this fact to imitate the paleness characteristic of age by the addition of such substances as skimmed milk, lime water, freshly-burnt charcoal, &c., which have the effect of partially decolourizing the wine without much injury

to its other properties. The brown tint often communicated to light wine from long standing in casks may be removed to a great extent by the same agents. Natural brown Sherry is thus converted, whenever desired, into pale or golden Sherry.

Various ingredients are added to inferior wines to give them the flavour of more expensive ones, and also with the object of imparting the aroma of the genuine wine; amongst the ingredients employed for such purpose may be mentioned as the principal, bitter almonds, essential oil of almonds dissolved in spirit, and almond cake; a nutty taste may be given by the use of these to poor, thin, Sherries; Rhatany rind, bark, oak sawdust, alum, &c., lend astringency, and tincture of raisin seeds, a resemblance of the peculiar Port wine flavour. For the production of characteristic odour or bouquet, a large variety of drugs or extracts is available, such as orris-root, orange flower water, oil of neroli, *essence de petit grain*, ambergris, vanilla, violet petals, essence of cedrat, sweet briar, elder flowers, quinces, cherry laurel water, &c.; a few grains of ambergris, rubbed down in a mortar with sugar, and stirred up in a hogshead of Claret, will impart to the whole a highly-prized flavour and bouquet.

Detection of Adulteration.—No one but a skilled analytical chemist can with any certainty discover whether a wine is adulterated or not, unless the false colouring or flavouring is so gross and obvious as to reveal itself to ordinary observation, especially on the part of a person practically familiar with the appearance, taste and odour of wines of the same kind known to be genuine. To give a list and description of the scientific

re-agents employed for the detection of wine adulteration would therefore be quite useless in such a work as the present, especially as the bulk of the adulteration is done abroad, thus leaving little or no remedy in the hands of the English importer.

The best precaution at the command of respectable dealers and retailers is to make all their purchases of importers whose names are above suspicion, men who would as soon think of committing a petty theft as of having in their possession a wine known to them to be fabricated. By adopting this course, the spurious wines of Hamburg, Cette, Marseilles, and other places may be avoided, for there is hardly any celebrated firm in England that has not agents resident at the vineyards of Xeres, Oporto, and Bordeaux, to uphold the character of their brand.

A direct shipper will not supply a private customer. He confines his transactions entirely to those in the trade, for whom he prepares priced lists, and every information necessary for the selecting of any description of wines, either in bond, at the port of shipment, or at the vineyards.

In the previous chapters particular notice has been taken of the strength of wines of different countries, as the duty is determined thereby. We would again strongly recommend all wine dealers, and indeed even private persons keeping large stocks of wines, to provide themselves with the simple distillation apparatus described on page 6.

Petiot's Foreign-made imitation wines.—In France and Germany large quantities of so-called wine are made by

the following process invented by Petiot in 1852. The juice, when pressed from the grapes is measured, and its richness in sugar ascertained by the usual methods; a solution of sugar in cold water, equal in strength to that found in the must, and of corresponding bulk is then poured on the *marc* (grape residue). Should the artificial must so prepared be found deficient in free acid, tartaric acid must be added to make up the normal amount. Fermentation quickly ensues, and ends in two or three days. The marc is again treated with a sugar solution of similar bulk and strength, and sometimes the process admits of being repeated three or four times, a longer period being allowed for the liquid to rest on the marc according to the number of infusions made. As a rule the natural grape juice first obtained is fermented separately, and the wine from it kept distinct. The infusions obtained by the several steepings of the grape residue in the sugar solutions, after having been fermented, are mixed together and treated in the same way as the natural wine. Such products are reported to be rich in spirit and of excellent odour and taste; the wine in fact is said to have a finer bouquet than ordinary wine, and to possess superior keeping qualities. If white grapes are used in the process above described, the more luscious they are the better wine produced; with dark grapes over-ripeness is found to be objectionable as it causes the wine to age too rapidly.

It is believed that a good deal of this artificial wine now finds its way into England.

Chapter Sixteenth.

MANAGEMENT OF WINES, BOTTLING AND KEEPING.

Selection of Wines—Cellars—Temperature necessary in Wine Cellars—How to arrange Casks—Bins and Bin Books—Cellar Porter's Ticket—French Wines best when Imported in Bottles—Port and Sherry drunk from the Wood—Fining—Number of Eggs used in Paris—Care necessary in Maturing Wines—How soon Port, Sherry, Claret, and other Wines may be used after Bottling—Bottles—Corks—Degenerate size of Bottles—M. Behic's Circular to French Chamber of Commerce, as to Frauds in size of Bottles exported to England—Cleansing, Waxing, and Storing Bottles—Decanting.

THE proper selection of wine is, perhaps, the most difficult part of a merchant's business. His trade may not be only with private families, but also with public establishments. No two classes of persons agree as to the purity and excellence of any particular wine, as those who drink strongly-fortified wines and spirits have a less delicate and discerning palate than those who drink and appreciate such wines only as possess softness and bouquet; but every merchant knows from experience the sort most likely to suit the majority of his customers, and makes his selection accordingly.

Cellarage.—Another difficulty which in many places is almost as great as that first stated, is to obtain a cellar

suitable for the requirements of bottling, racking, &c., and for preserving in good condition the various wines requiring to be stored in it. In so changeable a climate as that of England, it is almost impossible, except when the cellars are at a considerable depth below the surface, to regulate the temperature throughout the year in such manner as to adapt it to the lighter wines—Claret, Hock, Champagne, &c.—and to make it suitable also for the more alcoholic kinds—Port, Madeira, &c.

The best cellars are those well placed underground, where sufficient humidity can be maintained without excessive dampness. If the cellar is too dry the staves of the casks are apt to leak, and let the wine escape; if too damp everything gets covered with mould. The roof should be solid, to prevent any vibration from passing vehicles, &c., from affecting the finer sorts of wines. The bottom should be dry, and either covered with hard gravel, or paved with flags. The aspect should be to the north, and the air holes (more or less numerous, according to the dampness) should be made on the side least exposed to the rays of the sun. Where a large stock is kept, the cellar should be divided, so that while the mean temperature of one part containing the strong wines may be kept up to 53 degrees, the other part, containing Champagnes, Clarets, &c., may be no greater than 44 degrees.

Where a regular temperature cannot be ensured by natural means, arrangements should be made to supply artificial heat by jets of gas, or hot-air pipes during the winter, and to secure proper ventilation in summer. The best average temperature is from 55 degrees to 65 degrees Fahr. For Clarets, Burgundies, &c., 55 degrees

is most suitable, and for Port, Sherry and other strong wines, 65 degrees.

The casks should be placed upon stands about twelve inches high, the heads parallel to each other, in a line as straight as possible, with the bung holes uppermost. Each cask should be so thoroughly wedged up as not only to keep it steady, but to prevent it also from touching the walls of the cellar, or the casks on each side of it. When a cask is not placed perfectly level, the lees will not settle in the bottom of it, and the wine cannot be drawn off clear.

Too much attention cannot be given to having that portion of the cellar intended for storing the bottled wines properly partitioned off with bins, so that each quality may be easily stored and readily removed as required. The old-fashioned stone and brick bins are rapidly giving way to the more useful and clean iron ones, which are now made to fit any cellar. Each bin should be numbered, and when any wine is placed therein, the particulars entered in a book termed a "Bin Book," in the form like the following :—

BIN, No. 1.

Date.	Description.	Doz.	When, and to whom sent.		Doz.	Botts.
1878			1885			
Dec.24	San leman's		Jan.27	Mr. Jones	6	
	Port, Bottled		Mar 12	Mr. Boyes	12	
	from Hhd.	27	,, 14	Mr. Esther	8	
	No. 4, cost		,, 28	Mr. Toms	,,	6
	£ ,, ,,		,, 31	Private consptn.	,,	6
		27			27	

In large establishments they have, as well as the Bin Book, a printed "Porter's Ticket," on which is written the number of the bin, the quantity required, and the name of the customer. This ticket is sent from the counting-house to the cellar, for the porter's guidance. In small firms, of course, a ticket may not be necessary; but no dealer of any magnitude should be without a bin book; and we recommend to our readers a very cheap and useful one which the publisher of this volume has had prepared for the trade.

Bottling.—The law does not permit bottling in bond, except for exportation, so the merchant must bottle at his place of business all wine intended for home consumption. Champagnes and all other effervescing wines must of course, be imported ready bottled; but large quantities of ordinary French still wines are also brought into this country ready bottled, as it is a pretty general belief in France that the English are not expert at the delicate handling and treatment requisite for successful bottling of light wines.

Port and Sherry are perhaps as well drunk from the wood as the bottle. Sherry wine stored in wood not only keeps its strength but in many cases acquires a better flavor than in bottle. Sherry not intended to be kept any number of years, is certainly better in the wood than the bottle.

Wines that are thoroughly matured when imported are always more expensive than those that require ripening in the merchant's cellar, but the latter need so much

experience and care in order to preserve their characteristics, that few will risk shipping them unmatured.

Port, Claret, and other red wines may be tapped almost immediately after being fined, but Sherries are not fit for bottling for several weeks. In fining Port, special care has to be taken that some of its colour is not destroyed by a too free use of the whites of eggs and isinglass, which, when combined, are apt to carry it down with them to the bottom of the cask.

All wines precipitate to the bottom and on the sides of the cask or bottle part of some of the matter previously held in solution, which when deposited is termed *lees* in the cask and *crust* in the bottle. Port and other strong wines should be allowed freely to deposit in the wood before being bottled, as they otherwise do not form a fast holding crust, but deposit it so quickly and largely that it moves about in the bottle on the slightest motion. Port will crust better in common English bottles than in any others; but in order to make it hold firmer, all new bottles should be carefully rinsed out with shot, which tends to roughen the sides.

In bottling wines, the corks should be new and of the best quality. Every cork that is not sound, well cut, and free from the slightest defect, should be discarded, or it will give a bad taste to the wine. Immediately before being placed in a bottle each cork should be compressed by a cork-squeezer, or one of the numerous machines made for that purpose. If the corks used are sound and good when bought, they need no preparation of any kind before putting them into the bottles, except simply

to dip them in clean cold water and compress them in the squeezer. Very hard corks may, however, require to be soaked for a short time in hot water, but they should invariably be strained off and well dried before use.

The bottles should be of good manufacture, sound, clean and dry, and free from the least mustiness or other odour. To enable their being properly and safely packed in the bins, they should be of equal diameter throughout.

Much has been said in this country, through the columns of the press, as to the propriety of altering the size of bottles to imperial quarts and pints, but while it would be very proper to inflict on every dishonest person using, for his own profit, bottles of less than one-sixth or one-twelfth of a gallon, we cannot but think that the present size of our *reputed* quarts and pints has much to recommend it; a full quart bottle of almost any light wine, when once opened, must as a rule be consumed at one time, or the remainder, however carefully corked, will grow sour and undrinkable before the wine is again wanted for use. In a less degree the same may be said of full pints. The smaller quantity contained, on the other hand, in *reputed* quarts and pints, does not afford occasion for so much waste and spoiling, and the size and shape of such bottles are much more convenient for packing and for arrangement in a cellar.

At least the day before being filled, the bottles should be thoroughly cleansed and turned up to drain. It is sometimes the practice to rinse them out with a little brandy or wine before being filled, but brandy should never be used when the wines are choice, as the flavour might be injured by the slightest trace of added spirit.

A fine clear day should, whenever possible, be chosen for bottling, and the utmost care and cleanliness exercised during the operation. Great caution should also be taken to avoid shaking the cask, and thus disturbing the bottom; any portion that cannot be drawn off clear should be passed through the bag filter (see description at end of book), and when bottled should be set apart as inferior to the rest. Another plan is to collect all the lees in a cask kept for the purpose, and when they have stood some time, to use the clear wine at the top for filling up casks about to be fined. In order to prevent breakage or loss in bottling, the coopers generally place each bottle before corking it in a small boot or bucket having a bottom of soft cork or leather, which is strapped to the knee of the bottler. So expert do bottlers become that they seldom break a bottle, although they "flog" the corks in very hard. An illustrated description of the most improved modern bottling machines is given in the advertisements at the end of the work.

When corked, the bottles should be waxed, or as is done in France, the corked necks should be dipped in a composition made of rosin, pitch, yellow wax, and red mastic, melted together. The different wines are distinguished by a different colour being added to this composition.

All bottles after having been thus treated should be placed on their sides in the bin, never in an upright position, so that the corks may always remain wet. Coarse wines are frequently covered with sawdust, while the choicer sorts are kept cool and in good condition, by being covered with fresh-water sand.

Shortly after bottling, some wines become cloudy and unfit for drinking. Clarets of the best growths are occasionally drunk immediately after being bottled, but to obtain their true bouquet and flavour they should remain at least a year or two before being touched.

Fining.—The merchant who blends and bottles his own wines cannot pay too much regard to their proper fining. No specific rules for the purpose can be laid down, as young and full-bodied wines required to be treated differently from those which are old and mature. Every cellar-man has his own particular method of fining wines, but in all cases the best ingredients that can be used are the whites of new-laid eggs for red, and isinglass * for white wines. The number of eggs that used to be employed in Paris alone in clarifying wines was about five millions per annum, and to avoid this abstraction of so nourishing an article of food from public consumption certain kinds of powders have recently been introduced, which, at less expense, answer the purpose equally well.

Great care should be taken to avoid using an excess of isinglass or other fining matter, even in the case of heavy, thickish wines, the quantity of finings employed ought never to be greater than at the rate of half an ounce of isinglass to the hogshead Rhine wines do not require more than a quarter of an ounce, and Hocks still less. The isinglass should be * steeped in water until it

* The following is a good receipt for the preparation of isinglass finings—Take say, two ounces of fine isinglass, cut it into small pieces, and steep it in tepid water until it assumes a paste-like appearance. When quite softened in this manner, remove the paste from the water and beat or work it up into as smooth

becomes jelly-like and then thinned in wine. If, at any time, pure isinglass cannot be obtained, hartshorn shavings or pale, sweet glues may be resorted to, but only as a temporary expedient.

Fining of all kinds, however skilfully performed, is however, a slow and wasteful process; and the more rapid and satisfactory system of filtration rendered possible by the modern method, will be found in every case where it will admit of being adopted to afford better results. The old-fashioned plan of filtering through a flannel bag is now discarded as being little, if anything superior to fining. But, the speed with which thick liquids can be clarified and rendered perfectly bright at one operation by means of a pulp of porous paper, and a suitable framework for straining, is one of the marvels of applied science. A full description of the kind of filtration here referred to, and of the improvements effected in it by the publisher, will be found at the end of this work.

Decanting.—No matter how brilliant is the condition of wine when bottled, a sediment will soon be deposited, rendering the careful decanting of it absolutely necessary. To decant wines properly is a difficult task, without the aid of one of the many patented machines for preventing the air rushing into the bottle on its being turned down, and thus disturbing what should be a steady and continuous flow.

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and thin a condition as possible, then return it to the water, and stir up until the whole becomes quite liquid. Add four quarts of any white wine, and stir up until a thick jelly is formed. Put into bottles, cork up and use about half a pint for every 60 gallons of wine requiring to be fined.

As a general caution, never decant wine without a strainer, with a piece of fine clean cambric placed in it to prevent the crust and particles of cork from passing into the decanter. In the decanting of Port wine, do not drain it too close, and there are frequently two thirds of a wine glass full of thick dregs in each bottle that ought to be thrown away. In white wines there is not usually much deposit, but then the liquid should nevertheless be poured off very slowly, the bottle being raised gradually. Sherries and other full-bodied wines are best decanted an hour or two before using; but Clarets and all wines of that class should be left undecanted till the moment before placing them on the table.

Racking.—This operation should be performed in cool weather, and preferably early in the spring; a syphon is better for the purpose than drawing off by a cock or a faucet. The bottoms or thick portions may be strained through a wine bag, and the clean running added to an inferior wine. Loftus's Rapid Filter is the best that can be used.

Disorders of Wine—Ropiness (*Viscidity*).—This very common disease of wine is supposed to arise from there being too little astringent matter present naturally to throw down the mucilage albumen, &c., developed in the wine. The obvious cure for such thickness or cloudiness is to supply the principle deficient in the liquid, which causes the coagulation and precipitation of the floating particles. *Tannin* obtained from oak bark, a perfectly harmless substance, is found to be the most efficient agent for the clearing of wine affected with ropiness. Ordinary isinglass or egg finings will not answer under such

circumstances, as they contain nothing of an astringent nature. Tannin, which may be obtained in powder from any chemist or drysalter, is not dear; the proportion to be used is about 1 ounce to every 100 gallons of wine. All that need be done is to stir the tannin well into the wine and let the whole repose for a few days before drawing off. Where tannin cannot be readily procured, or where cheapness is an object, ground oakwood, gall nuts, or even wood shavings will effect the purpose; sometimes catechu, kino, and rhatany are employed. No perceptible taste is communicated to the wine if an excess of these substances is not used. Alum or gypsum should never be added. For pale white wines attacked by ropiness, a little pure tannin dissolved in proof spirit is decidedly the best remedy.

Flatness or Deadness.—The only useful treatment for this defect is the addition of a little fresh brisk wine of the same kind. Bruised sultana raisins, 5 or 6 lbs., or 2 or three lbs. of honey, and a gallon of good brandy to the hogshead will often answer pretty well. A considerable time, however, a fortnight at least, and even longer in very cold weather, is required for these agents to produce their full action and remove the flatness of the wine. A little yeast will sometimes greatly improve the condition by exciting a gentle fermentation if the cask be removed to a warmer situation. If there are any dregs of casks of the same kind of wine recently emptied to be had, a good effect may be produced by stirring these into the flat wine and rousing up once a day for a fortnight, then add a little brandy, and rack off.

Bitterness.—Chiefly found in wines of great age or that

have been kept at too high a temperature. The exact cause is unknown. Slaked lime has been used successfully as a corrective, five ounces to every 100 gallons of wine. An old remedy was to soak slips of linen in brandy or spirit of wine, and having racked off some of the contents and hung these slips in the vacant part of the cask, to set fire to them, and let them burn out of themselves, and afterwards to burn a brimstone match in the cask. The wine should then be mixed off with sound wine of the same quality. It is doubtful, however, whether there is really a good cure for decided bitterness.

Mouldiness.—Mould or fungus is very often the result of keeping the wine in too warm a cellar, or in a cask not quite filled up, or from one of which the bung has been left out. As mould forms chiefly on weak wines, it may be referred to a want of sufficient spirit in the wine. The best method of removing mould is to burn sulphur in a partially-filled cask, or else to rack wine into a fresh cask in which sulphur had previously been burnt. Wines so treated should be consumed without delay. Sometimes wine acquires an unpleasant musty taste from having been put into a dirty cask, or one that had been long unused. This taint may generally be removed by adding a little sweet, olive or almond oil and rousing vigorously. The cause of the bad flavour is the presence of a volatile oil, which the added fixed (non-volatile) oil combines with, and carries to the surface, whence it may be skimmed off or the underlying wine be drawn off. Another way is to mix in a little freshly-burnt, coarsely-powdered charcoal, or some pieces of bread toasted black, or some bruised mustard seed. If all these methods fail, a solution of

chloride of lime, or scouring with hot strong soda liquor, followed by plain water, may restore the sweetness of the cask. Weak sulphuric acid (oil of vitriol) and water, one pint acid to four of water, is often found efficacious; there must of course be careful rinsing with plain water afterwards.

Caskiness.—This is the general name for the taint given to wine by a foul cask, or a new cask not properly seasoned. There is but one effective method of dealing with wine so affected. Rack into another cask of larger size ascertained to be quite sweet, stir in some freshly-burnt wood charcoal in coarse powder, close up tightly and leave the wine to itself for a few days. If treatment of this kind proves unavailing, after one or two trials with fresh charcoal, the case may be regarded as hopeless, since all other deodorising agents, such as permanganate of potash (Condy's fluid), chloralum, &c., communicate a disagreeable flavour to the liquid, however innocent may be their effect in point of health. Red wines are apt to lose some of their depth of tint on contact with charcoal, but a little harmless colouring matter, such as infusion of logwood will bring this all right again, and cannot be considered objectionable. As to quantity, half a pound of fresh charcoal to the hogshead, well stirred round, ought as a rule to be sufficient. The wine must be carefully drawn off after repose, in order to avoid disturbing any deposit. It is a good plan to heat the charcoal before adding it to the wine.

Should wine with a marked casky flavour resist the treatment above described, there is no practical remedy

but to mix it carefully with other wine of the same kind, and to sell the whole at a reduced price.

Acidity or Hardness.—All the known alkaline remedies for this defect are apt to affect the flavour of the wine, and give it sometimes a griping or purging quality. Powdered marble, or hard lime-stone, added in very small quantities at a time, and well stirred in until the acid flavour seems removed, is perhaps the least objectionable expedient. If judiciously used, the marble or lime-stone uniting with the excess of acid in the wine, does not alter the flavour, &c. in any marked degree. No rule can be given for the amount of lime to be employed for this purpose, as all must depend on the greater or less acidity of the wine. The palate is the only criterion in such a case.

Soda and potash in any form should never be used as correctives of acidity in wine; the compounds these substances give rise to are both nauseous and injurious; they impart also a peculiar flatness of taste to the wine which nothing is able to overcome.

In some instances, tartaric acid has been found a useful remedy, as it forms an agreeable ether (acetic ether), with the excess of acetic acid or vinegar in the wine, but special skill is requisite in applying such delicate treatment as this. When the wine is not *very* acid, a little sugar or pure syrup, carefully added, will cover the sour taste to a great extent and do no harm to the keeping properties of the wine.

In order to prevent acidity in wine, it is of great importance that each cask should be kept full to the bung hole, and each bottle tightly corked with a sound cork.

When there are signs of too much acid forming in wine in cask, good may be done by sulphuring a clean empty cask with lighted brimstone matches, and racking the wine into it; or a current of carbonic acid gas may be passed through the liquor with advantage, this gas having the property of arresting the growth of the vinegar fungus. Exceedingly sour wine is only fit to be made into vinegar.

Over sweetness.—No known remedy but gradual ageing in cask or bottle; of course the addition of spirit, if otherwise admissible, will to some extent mask the too luscious flavour of the wine.

Imperfect maturation or ripening.—The natural ripening of wine depends upon the gradual conversion into alcohol of that portion of the sugar originally present which escaped the first fermentation. This process is best conducted in vessels which entirely exclude the air—in bottles for instance—as free contact with the air, especially at a high temperature, leads to the production of acetic acid (vinegar). When wine is in casks, the pores of the wood afford entrance to the air, and cause more rapid spoiling of the wine for this reason. Tartness or acidity is usually regarded as a sign of age, whereas under the circumstances just explained, a thin, weak wine, contained in a cask, must become almost undrinkable from excess of acid in a week. The ripening of wine is really due to the progress of a very slow, gradual, second fermentation, or in other words, to a fermentative change kept in check by the presence of the spirit already in the liquid, and a low temperature.

To promote sound, healthy maturation, the best plan in the case of stout wines, is not to rack them until they have stood a year, or a year and a half upon the lees, and to keep them during this time, if possible, in a cellar free from draughts, and not too dry, at a temperature between 55° and 65° Fah. Strong Sherries and Ports, when bottled and treated in this manner ripen very quickly. Light wines of no great strength will not bear long keeping in cask; all the necessary ripening that should precede bottling should have been accomplished by the wine grower or maker before importing into this country. The dealer here can do little else than get the Claret, Hocks, &c. which reach his hands in casks, ready for bottling as soon as possible, if the wines are not so when they arrive.

Chapter Seventeenth.

RATES OF DUTY; CUSTOMS REGULATIONS; "CLEARING" WINE.

Arrival of Wine in Port—Wine Agents—Entry of Wine for Home Consumption—Prime Entry for Duty—Post Entry—Warehousing Entries—Sight Entry—Sampling, Racking, Blending, Fortifying, and Bottling Wines in Warehouse—Duty on Wines.

THE present rates of duty on imported wines, foreign and colonial, are as follows:—

If containing less than the following rates of Proof Spirit, as rectified by Sikes's Hydrometer,

	26 degrees			42 degrees.		
	£	s.	d.	£	s.	d.
Red Wine White Wine Lees of such wines	0	1	0	0	2	6

And for every degree of strength beyond the highest (42 degrees) above specified, an additional duty of 3d. per gallon. Thus a wine found to contain, say, 44° of Proof Spirit, is chargeable with the duty of 2s. 6d. per gallon, and 6d. extra for the two degrees of strength exceeding 42°, or in all 3s. per gallon.*

* By the terms of a treaty recently arranged with Spain, the limit of the lower duty will shortly be raised from 26° to 30° of proof spirit, thus admitting a considerable proportion of natural or but slightly-fortified Sherries at the one shilling rate.

The strength of wine for the levying of the duty is ascertained by distilling off a small representative sample, adding water to the liquid distilled over, so as to make up the original bulk, and then applying the hydrometer as in the case of ordinary spirit.

By the Customs regulations, if any wine offered for duty is from its high strength, or other cause, thought by the officer not to be a genuine wine of commerce, the goods are to be detained until the decision of the Board of Customs has been obtained as to admitting to payment of the wine duty. All liquids entered as wines and found to contain 45° of Proof Spirit are to be treated similarly.

Arrival of Ship,—Agents.—On the arrival of any ship containing wines, notice is immediately given to the consignees, who make entry with the Customs for their consumption, warehousing, or transmission under bond to another warehouse. The forms necessary to be observed, will be described under the head of each transaction. In the port of London, none other than the wine merchant, his recognised representative, or a licensed agent, can enter or clear wine. When the merchant is not familiar with the *modus operandi*, it is much better and far cheaper to employ an agent to do all that is necessary from the time that the wines leave the foreign port until they reach his cellar, as these agents are, in almost every instance, men of great honour and experience, and in no way exorbitant in their charges for the services they render.

Entry of Wines for Home Consumption.—Before any goods can be unshipped it is necessary to deliver to the

collector, or other proper officer, in the Long Room, a perfect entry of the same in the form prescribed by Act of Parliament, or to that effect, taking care that the particulars of such entry correspond with the report of the ship, or the bill of lading with which the merchant is furnished.

This entry must be in triplicate, and one copy written in words at length—the other two copies may be in figures—but the entry is not good unless the wines are described by the proper denominations, as "red wine," or "white wine," and the quantities chargeable with duty inserted. This document is technically known as the "prime entry;" it is, in fact, the first or principal entry, and for many centuries was the only description of entry permitted for the foreign goods introduced into this country. From time to time, however, great modifications and immense improvements have been introduced in the management of the Customs branch of the Revenue.

It is also called a "prime entry," because, from various reasons, it may be incomplete, and a further entry be required; as, for instance, a merchant may have entered twenty casks, containing 1,000 gallons of wine, whereas, upon examination by the proper officers, the casks may be found to contain 1,063 gallons of wine. A post entry may then be passed for the difference, referring therein to the date of the prime entry; or the reverse of this may occur, the merchant having entered too much, say 1,063, and the officer finding only 1,000 gallons of wine, then an over entry certificate may be taken out, and the surplus money returned.

ENTRY FOR HOME USE (PRIME OR POST).

Whether Prime or Post, and if Post, date of Prime entry

_____

Port of Importation_____

Dock or Station_____

Merchant in whose name the goods are entered_____

Importer's name_____

Ship's Name—Date of Report—Master's Name—Port or Place from whence_____

(Here state particulars according to above headings.)

Marks, Numbers—Number of Packages, quantity and description, and if a prime entry, value of goods, in accordance with the requirements of the Official Import List.*

(Here state particulars according to above headings.)

Total amount of duty payable on this entry, £ . .

Dated this day of 18

(Signed)_____

Importer or his Agent.

This entry, duly signed by the proper officers, is forwarded to the dock or quay where the vessel is discharging her cargo. An order is there issued for their landing, the goods are gauged, assessed by the laboratory officers, and if found, both in quantity and quality, to agree with the entry, they are forthwith delivered to the merchant or his representative, upon the dock charges,

* In this entry, the strength of the wine must be stated. The merchant ought to have no difficulty in doing this, as his knowledge of the wines he is importing should at once enable him to say whether they are under 42 or 26 degrees.

freight, and other expenses being paid. If upon the other hand, either the quantity or quality exceeds that which is prescribed in the prime entry, a post entry must be taken out, and the difference of duty paid. The same form (see precedent above) now answers, for both prime and post entries.

If goods are over-entered the officer is directed, by his instructions, to inform the importer of the fact, and furnish him in writing with the particulars of the amount so over-entered. Upon the receipt of this information the merchant may make application to the collector, who will cause an over-entry certificate to be issued, and the duties overpaid to be returned.

If the goods are not entered within fourteen days of the ship's reporting, the officers are authorised to send the goods to the Queen's warehouse; this occasions expense as well as delay. To prevent this, of late years it has been usual for the dock companies or the brokers of ships to take out what are called "imperfect entries," upon which the goods are landed, gauged, and warehoused, till the proper owner claims them. To ensure promptness and dispatch, as soon after the arrival of the ship as possible, the entry should be passed, and the place of landing and warehousing, whether at the legal quays, docks, or wharves, written in legible characters on the top of the entry.

Entry for Warehousing.—If the goods are not intended to be cleared at once for consumption, but to be deposited for a time in warehouse, the warrant must have that fact expressed in words at length, on the right-hand corner,

just above where the merchant or his agent's name is written.

ENTRY FOR WAREHOUSING.

Port_____

Dock or Station_____

Importer's Name_____

Ship's Name—Date of Report—Master's Name—Port or Place from whence_____

(Here state particulars according to above headings.)

Marks, Numbers—Number of Packages, quantity, description and value of goods, in accordance with the requirments of the Official Import List.

(Here state particulars according to above headings.)

I enter the goods to be warehoused at_____

Dated this day of 18

(Signed)_____

Importer or his Agent.

Two copies of this document are sufficient. The wines will, immediately after being gauged, be tested by the proper officers, and the number of degrees of proof-spirit they contain ascertained, and furnished to the importer or agents on application.

All wines are sampled for testing as soon as possible after being landed. The proportion taken is at least one in eight of every mark; if there be less than eight in a mark, then one of every mark. If the goods are to be removed to another warehouse, the same process is observed, and the same proportion of samples is taken, but if they are entered for exportation only, no testing is

necessary, simply because no duties having to be paid, there is no utility in ascertaining the strength of the wine.

Whenever goods after having been warehoused on first landing, are to be transmitted under bond to some other port or place, two copies of the entry are lodged in the Long Room, one in words at length. One of these is forwarded to the Comptroller of Accounts, whereupon a *slip* is issued. The wines are sampled and gauged afresh, and the slip with these particulars recorded is returned to the proper officer. The entry before referred to must contain a full description of the marks and numbers, as well as the quality and denomination of the wine; it must also describe the mode of transmission, whether by steam, sailing-vessel or rail; the name of the port to which the goods are consigned, and the name of the consignee. Upon all these particulars being furnished, and bond* given in the amount of duty, the goods will be duly labelled, "to the Collector of the port of destination, and a letter by post forwarded to inform him of their despatch, mode of conveyance, content, ullage, &c." As the goods are considered to be still under the care of the importer, it will be necessary that he inform his consignee of the date of their transmission aud probable arrival, in order to their being re-entered and warehoused, otherwise great delay and confusion may arise. If the importer enter and even land his wines to be warehoused, he may change his mind as to the disposal of them, and subsequently

* The bond required to be given in these cases must have one sufficient surety, and the amount or penalty must be at least equal to the duty chargeable on the goods.

enter them, or any part of them, for duty, or for exportation, provided they be not actually warehoused, and then, upon such further entry, the goods will be delivered.

On the removal of wine to a warehouse at another port or town, the following warehousing warrant has to be passed :—

WARRANT FOR THE DELIVERY OF WET GOODS FROM A BONDED WAREHOUSE.

Port or Collection_____

To the officer in charge of No._____Warehouse, _____Street,_____Notice is hereby given to deliver the undermentioned_____cask of _____wine, from *(state the country)*_____ for removal to_____

Signature of remover, authorized person, or name of firm ... ... } J. B.

Address_____

Date of delivery.

Landing or Warehouse account.

To the officer in charge of No._____Warehouse, _____Street,_____you may allow the delivery of_____cask of_____wine, upon which the duty and charges do not exceed the sum of_____ pounds,_____shillings and_____pence.

_____gallons, @_____per gall._____£

Charges at 5 per cent_____£

Bottling charges_____£

RE-EXAMINATION.

Total_____

Bonder's Name—Marks and Numbers—Content—Actual Strength—Ullage—Deficiencies allowed—Charges.

C. H. officer.

N.B.—The particulars as to duty and entry charges apply only when the wine is intended for home consumption.

The charges at 5 per cent. referred to in the precedent above, are to defray the expenses incurred by the revenue in warehousing and delivering goods for removal or consumption. On wines so re-warehoused being required for consumption, a similar warrant has to be passed, only substituting the words "for home consumption," in place of "for removal."

Bill of Sight.—There is yet another mode of entering wines, that is by "Bill of Sight." This is rarely resorted to for this description of merchandise, because the merchant being generally acquainted with the description of goods with which he has to deal, cannot declare, as the law requires, "that he is not in possession of sufficient information to make perfect entry thereof." If, however, this should be the case, he can, by attending and making the proper declaration in the Long Room, make entry by Bill of Sight. He is then furnished with a form, as well as an order to land his goods. The Bill of Sight is as follows:—

Entry by Bill of Sight.

Port_____

Dock or Station_____

Importer's Name_____

Ship's Name—Date of report—Master's Name—Port or place from whence—Marks—Numbers—Number of packages, with the best description the Importer is able to give.

(State the particulars according to ths headings given above.)

I,_____the Importer (or agent to the Importer), of the goods above mentioned, do hereby declare (if importer,) that I have not, or (if Agent,) that to the best of my knowledge, he has not received sufficient invoice, bill of lading, or other advice, from which the quantity, quality, or value of the goods above mentioned can be ascertained.

Dated this_____day of_____18

(Signed) Importer (or his Agent).

This is a mere provisional order for landing the goods for examination by the Importer or his agent, in the presence of the proper officers of the Customs. One of the conditions of its being issued is, that within three days of the goods being landed, and before the delivery, a Perfect Entry shall be made. This is effected by endorsing the Bill of Sight, with full particulars of examination, as in the case of a Perfect Entry, when the merchant is at liberty either at once to pay the duty, lodge the goods in warehouse, or have them removed under bond to another warehouse. No goods can be removed from a warehouse without entry, under heavy penalties—the duties being immediately levied upon the warehouse-keeper, and the parties concerned in the transaction being liable to prosecution for misdemeanour. Further, no improper or clandestine access to or interference with the goods, by the

merchant or his agent, is permitted, and parties attempting it are subject to a penalty of £100 for every offence.

Operations in Warehouse.—Hitherto, little has been said about the operations in warehouse. These constitute the principal part of the wine merchant's business, inasmuch as the management and preparation of his goods for home and foreign markets are concerned. We shall, therefore, devote a part of our remaining space to this important subject.

Sampling.—The merchant is allowed one sample of three gills, free of duty, from each original cask of wine imported into the U.K., having not less than 20 gallons content, when first deposited in warehouse, provided such wine has not been previously sampled. These are recorded in the warehouse-keeper's books against him, but he may take out an order and continue to sample his goods, *ad libitum*, subject to payment of duty at the rate of three pence for each such further sample of three gills. This duty is to be paid at monthly intervals on the usual warrant form. The practice of sampling is frequently resorted to by beginners in the wine business, in order to satisfy their customers. Indeed in many cases, casks of wine of particular kinds are imported merely for the purpose of sampling.

Blending and Vatting.—Foreign wines in warehouse may be vatted or blended as often as required by the merchant on his written request in the proper form. But the operation of blending wines *in a vat* can only be performed in a compartment of the warehouse, fitted and specially approved for and devoted to that purpose.

Blending from cask to cask, however, may take place in an ordinary bonded warehouse.

On making request to put together wines of the same sorts, whether in vat or otherwise, the merchant is at liberty to describe the operation by the name either of "Vatting" or "Blending," and may mark his casks accordingly when the operation is complete. But when spirit is added to such wine for the purpose of fortifying, or when any other article allowed by the regulations, except common finings, is added, or again when any portion of such wines has been previously vatted, the operation is to be described as a "Vatting."

In the request to Vat or Blend, the county of production must be stated.

Wines intended to be vatted or blended for home use must be of the same sort—that is, of one colour, country and rate of duty.

When the wines are of the same mark, brand, description, country, and rate of duty, but of different importations, the original marks and brands are allowed to remain; but the word "Vatted" or "Blended," as the merchant may request, is to be deeply and legibly cut in, together with the date of the operation, on the front head of each cask. When not of the same mark, &c., all original marks, brands, and particulars of importation must be erased, and the words Vatted or Blended as the merchant may elect, must be deeply cut on the front of each cask, with the date of the operation, &c., as above.

By special permission of the Board of Customs or Excise, wines of different strengths, &c., may also be

blended or vatted for home consumption. The several cases are as follows :—

Wines of the same sort as to colour or country, but subject to the different rates of duty; the produce of the blending, &c., will be charged at the higher rate.

Wines from the country of their growth, with wines of the same colour and rate of duty from a country not being that of their growth, on proof being given of common origin.

Wines which have been fortified by special permission with more than 10 per cent. of spirit, with other wines not so fortified.

Wines which have been fortified by special permission to an extent exceeding 40 per cent. with other wines of the same sort not so fortified.

Wines which have been *accidentally* fortified beyond 40 per cent. with other wines not so fortified.

In all these three cases, if the result of the blending should be stronger than 40 per cent., the goods are inadmissible for home consumption, and can only be exported.

Deficiencies arising in any of these operations exceeding one per cent. on the bulk of the wines put together are charged with duty.

Fortifying.—10 per cent. of proof spirit may be used in the fortifying of any wine in bond for home consumption provided the strength be not raised beyond 40 per cent. of such spirit. If satisfactory reasons be shown and special permission be obtained, more than 10 per cent. of proof spirit may be used, but the wine must not be raised in strength higher than 40 per cent. proof spirit.

The kinds of spirit allowed in fortifying are, brandy; unsweetened foreign spirit generally, excepting rum; British plain and rectified spirits; spirit of wine. The last is the kind usually employed.

Racking.—This operation is defined to mean—

Drawing off wine bright from the lees.

Drawing off wine from a cask in bad condition into a sound cask.

Drawing off wine into casks of smaller capacity than of the original, or transferring the contents of several casks into a large one.

The casks into which wine is racked for home consumption must not be of less size than quarter casks.

All deficiencies beyond one per cent. occurring in the operation of racking are charged with duty.

Fining, Sweetening, Colouring, &c.—Common finings, such as spanish earth, albumen, unsweetened patent finings may be added to wines under 42 degrees of strength for home consumption, in any quantity, and as frequently as the merchant may consider necessary, and whether the wines be contained in the original casks, or have been vatted, blended or racked. Care must be taken that wine so treated is not reduced in strength from a higher to a lower rate of duty. Special permission must be obtained before a wine of 42 degrees proof spirit can be operated on in this manner.

Capillaire or sweet finings may be added to wines for home consumption in proportion not exceeding 1 per cent

Filling.—There is no objection to vacancies or *ullages* in casks of wine caused by evaporation, racking from

lees, or natural loss of any kind, being filled up from other casks under the following regulations.

If the wine drawn off for filling purposes is of the same mark and entry as the wine in the cask to be filled up, such cask may retain its original mark and particulars.

If the wine drawn off is not of the same mark and entry, but the quantity required for filling does not exceed 5 per cent. of the liquid contained in the casks which are to be filled, the filled casks may still retain the original marks and particulars; but should the quantity required for filling exceed 5 per cent., then the contents of the filled casks are to be deemed "blended" or "vatted," as the proprietor may desire.

Casks left "on ullage" after racking (except from lees or bad condition) may not be filled up, nor can any ullage be created for the purpose of filling.

Casks on natural ullage may by special leave be filled up with *duty paid* wines of the same kind; wine so treated is to be considered eligible for home consumption, and if still retained in warehouse, the quantity used to fill must be added to the merchant's stock.

Bottling.—Cannot be performed in warehouse, except for exportation or ships stores.

Repacking, &c., of bottled wines.—Wines in bottle may be started into casks, if it be shown on application to the revenue authorities that such an operation is necessary; and unavoidable deficiencies not exceeding 1 per cent. will be allowed.

Wines imported in cases may be adjusted and repacked, and cases either imported or packed in warehouse may

also be unpacked for remedying by renewal any damage to the labels or capsules caused by water or other accident, but labels or capsules must not be changed for others not identical in marks, &c.

Champagne and other sparkling wines in bad condition, may, on request in the usual form, be disgorged and re corked in a part of the warehouse set aside for the purpose. Deficiencies not exceeding 1 per cent. allowed.

Chapter Eighteenth.

ADDITIONAL NOTES ON CLARET, BURGUNDY, SHERRY, PORT, CHAMPAGNE AND OTHER SPARKLING WINES.

Claret.—Although the reduction of the wine duties in 1860, under which Claret, by reason of its low strength, was admitted at only one shilling a gallon duty, placed this wine within the reach of persons of very moderate means, and led to the cultivation of a taste for this kind of beverage amongst the people of England, yet it is certain that a relish for true vinous flavour, apart from a liking for high alcoholic strength, is not yet possessed in more than a small degree by the bulk of consumers in this country.

People accustomed to the fuller, more satisfying flavour and strong stimulus of brandied Ports and Sherries, cannot be brought for a long time to believe that a thin tasting, acid drink, like genuine ordinary Claret or Hock, is really a fine salutary beverage, much more suitable to the wants of the system, much more capable of being drank in quantity without injurious effect, than is the case with heavy, loaded wines, such as they habitually drank when a stimulant was desired. The popular expression was and continues to be, "Oh! that stuff

(Claret), is too poor and cold for me; very well in the summer, perhaps, as a cooling draught, but not at all to my fancy in cold weather, or as a regular drink." Especially does the so-called *acid* character of this kind of wine deter the majority from investing in it to any extent. Now it is this very objection on the ground of acidity that should be taken up and disproved by all who are well acquainted with the truth about the subject, and especially by wine merchants and dealers, whenever a person finds fault with a really sound wine, on the plea that it tastes to him over-acid. It should be explained with all the clearness possible, that that which tastes to him so strongly acid, is not derived in more than a slight degree from *free* acid in the wine, but from *acid salts*, a very different thing. It need not be feared that even a large proportion of the acid salts naturally contained in pure wine will affect the system injuriously or disagreeably. Any unpleasantness following the consumption of such wine, arises, not from the acid salts present, but from an excess of free acid, and in the majority of cases, this free acid is acetic, vinegar, in fact, developed by the gradual action of the air on a portion of the alcohol existing in the wine, and is not tartaric, citric, racemic, or other *fruit acid*, which would be much more wholesome and agreeable.

The point to be considered about Claret, Hock, Sauterne, and other light wines, when accused of tasting too acid, is that the cultivation of a better acquaintance with such beverages, the habitual drinking of them at meals, mixed with a little water, will soon render this impression of acidity grateful to the palate, and lead in the end to a

liking for them, in preference to almost every other kind of wine, *but the precaution should always be taken, as respects Claret, and indeed every other light red wine when the weather is at all cold, to have the bottle carefully and gently warmed before it is placed on the table.* Claret drunk in a cold or chilled condition tastes doubly acid, and is most unpalatable. White wines do not as a rule require this treatment.

It would be a pity on all the grounds of health and sobriety if the efforts that are being continually made by importers to furnish the British Public with sound Claret at a low price, should be frustrated and discouraged through mistaken notions as to thinness and sourness, on the part of the great bulk of the wine-consuming population. No pains should be spared to correct the prevailing predjudices in this respect.

The fact should be constantly borne in mind that the acknowledged sobriety of the French nation, taken as a whole, is due chiefly to their regular use of good, common Claret—*ordinaire*—as it is shortly called, in the place of all other stimulants; such wine is made to serve both as a medicine and a beverage, by moderating or increasing the quantity, and by diluting with more or less water at taste.

There is also the important fact that the acid present in a sound wine, corrects the effect produced in the stomach by the over-richness of certain foods, such as roast pork, &c., acting indeed in this manner, as would cider, vinegar, or the sharp sauces so appropriately served with rich dishes. The acid enables the stomach to

tolerate and digest fatty substances, which would otherwise cause nausea and discomfort. Nature would therefore seem to have provided in the acids, or acid salts of the natural wines, a most agreeable and useful means of counteracting the difficulty caused to digestion by the fat so abundant in most of our cooked meats and pastry. No wines act so well in this direction as Clarets and Hocks. Sherry, for instance, gives a temporary filip to the appetite, but has no appreciable influence in facilitating the digestion of greasy food.

Sauterne, a white wine, is really a description of Claret, it may be viewed as standing in the same relation to Claret, that Chablis holds to Red Burgundy.

A really good matured Sauterne is a high-priced wine, but drinkable Sauterne of fair quality may be bought, when young, at a moderate cost—say at a guinea a dozen. The fault usually found with common Sauterne, is that it is too sweet for a dinner wine, "doesn't go well" with food. It has on the other hand a very delicate odour, and makes a refreshing drink with cold water, or soda water.

Barsac, a species of Sauterne, has a strongly-marked flavour, which with many is not at first relished; this flavour arises, it is thought, from the flinty character of the soil, and the presence in it of an excess of salts of iron. Barsac is however a sound, generous wine.

BURGUNDY.

The leading characteristics of Burgundy in general are, fineness of colour, softness, spirituous strength, and bouquet. In the higher kinds, where no adulteration has

been practised, all these qualities attain great perfection; but even in the commonest Burgundies, when genuine, fulness of flavour, softness and aroma, are marked characters. The sugaring of Burgundy, a very general custom, quite destroys its excellence as a natural wine, and works dire mischief in the health of consumers. It is probably on account of this system of sugaring, that so much of the ordinary Burgundy sold in England, produces discomfort to the drinkers, and earns a bad reputation for the wine generally. Pure Burgundy has nothing in it more calculated to upset the stomach than pure Claret, Hock, or any similar unadulterated wine. It is said that the labourers in the province of Burgundy, who drink the coarser varieties of this wine as their daily beverage, are singularly exempt from gout and kidney diseases, and can do their work on much less bread than the peasants of other parts of France, a circumstance which puts in a strong light the sustaining and satisfying qualities of Burgundy as an habitual drink.

As a rule Burgundy requires to be kept from three to ten years, or longer, before it attains full maturity, and develops all its best qualities; a storage of, say, two years in wood, and seven or eight in bottle, will bring the wine to perfection. It is, of course, here assumed that we are dealing with an originally sound and generous wine. The great French chemist and naturalist, Pasteur, has asserted, that if wines in general, after the first fermentation, be heated by some suitable means to a temperature of about 140° Fah., all the effects obtained by the slow maturing of age may be at once secured, and at the same time, the risk of souring, &c. obviated. No success,

however, would seem to have attended the attempt to practise this system on the large scale.

Of the various ordinary Clarets which find their way to the English market the best known are the wines of the Mâconnais and Beaujolais districts. The wine-growing district of Mâconnais is situate around the town of Mâcon, and in this locality are grown all the varieties of Beaujolais as well as those called by the name of Mâconnais.

Amongst the Beaujolais wines, the best liked in England are perhaps the *Juliênas.** These Burgundies have a fine perfume, a deep clear colour, and considerable fulness; they also keep well. In respect of brightness and freshness of colour they are not excelled by any other wine.

Of the various Mâcon wines the best are Moulin à Vent and Pouilly. Beaune, Pommard, and Volnay are all well known and esteemed in England, Volnay being the finest of the three; it is to be had both still and sparkling. Of the great growths, called Romanée, Romanée Conti, and Chambertin, it is needless to write at any length; these are all connoisseurs' wines, beyond the reach of ordinary purses.

Chablis (white Burgundy) is a dry, flinty-tasting wine; it is not a product of the Côte d' Or, (*see* page 35), but of the department of the Yonne. Large quantities of so-called Chablis are consumed in England, chiefly at the beginning of dinner.

It is unfortunately the practice throughout Burgundy

* Not the district which produces the St. Julien *Claret.*

to plaster the common wines while in process of making, for the same reason though not to the same extent as in Spain, as a precaution against the formation of acetic acid; it is also usual to sulphur the casks before filling, and to add a moderate quantity of spirit where sugar has previously been put into the must. Owing to these various causes, a really genuine Burgundy of the commoner kind seldom reaches England.

SHERRIES.

Sherry in general, as it is known in England, is perhaps still the wine most largely consumed, except by the higher and more wealthy classes, who can afford to pay for the choice growths of Bordeaux, Oporto, or the Rhine. And yet, in spite of this popularity, ordinary Sherry, even of a fine kind, is the least natural of all wines. The qualities for which it is esteemed by the majority of the drinkers in this country, and indeed in many parts of the Continent, are almost wholly due to adventitious aid. As already described in Chapter 4, the first step in the treatment of the grapes, after gathering, is to coat them thickly with Plaster of Paris (sulphate of lime), for the purpose of taking away the natural acidity given to the grapes by tartaric acid. Sulphate of potash is thus substituted for tartrate of potash, and the basis of an artificial wine thus laid from the outset. With the commoner kinds of grape-juice sulphuring is next resorted to by burning sulphur (brimstone) in the vats intended for the reception of the must, the object being to prevent or diminish the formation of acetic acid when the imperfectly fermented wine is exposed in casks, not nearly filled up,

to a high temperature. After a time large doses of spirit are added—to the finer kinds two or three gallons to the butt (108 galls.), and to the lower qualities as much as six gallons per butt. A second dose is found to be necessary before the Sherry so plastered and treated can be properly clarified; and whenever the wine becomes "sick," as it is termed, spirit is again introduced, as the only remedy known to the grower. It is not to be wondered at, accordingly, that the bulk of the Sherries sent to England are found to be so hot, coarse, and heady.

Even the better kinds of Sherry sent to England are made from grapes of the third quality, yielding a must or juice, called *raya*. This *must* in its natural state is of a pale greenish-yellow colour, without any particular character. It requires to be sweetened and coloured in order to give it the full flavor and deep tint which people generally associate with the idea of Sherry. Before shipment it is the practice to add another dose of spirit, so that the wine may bear the voyage and reach its destination in good condition.

As respects the artificial colouring used for low-class Sherries,—the so-called *vino de color*, made by boiling down plastered must to a fifth of its bulk,—the quantity added to ordinary pale Sherry averages about 7 gallons to the butt, whereas "golden" Sherry requires 15, pale brown 20, and rich red brown as much as 25 gallons to the butt.

The colour of Sherry, as it appears in our market, is so variable, so purely artificial a matter, that in judging of the quality of any particular sample, the taste should be

the criterion and not the depth of the tint; but it should be remembered that a soft-drinking, palatable Sherry, full of nutty flavor and without much apparent heat, may be in reality an ingenious, deceptive compound, masking under its smooth, velvety flavor a quantity of added sugar and alcohol, the degree of success depending on the skill and experience of the blender. In this more than in the case of any other wine is it essential to obtain supplies from persons of known and established integrity in the trade.

Even in the bonded warehouses after the wine has reached this country, it is still a common practice to "fortify" Sherries, which when imported, are capable of receiving further additions of spirit, without overstepping the limit laid down by the revenue regulations (*see* page 141). It is possible in this manner to turn 1000 gallons of cheap wine, containing, say 30 per cent. of proof spirit when landed, into a compound still bearing the name of Sherry, measuring 1100 gallons, and having now the strength of 40°, by the simple addition of ten per cent. of proof spirit, the alcohol used being common potato spirit, diluted down to proof strength, and costing in that form, about one shilling a gallon. However profitable such a practice may be to the wine dealer or agent, it can hardly be regarded, when carried to so great an extent as above described, as a legitimate source of gain, in view of the injurious effect on the health of the consumer, produced by a liquid so highly loaded with common spirit, and retaining so little true vinous character of any kind.

On the subject of the treatment to which the bulk of the Sherry imported into this country is subjected, in

order to ensure its keeping well, and suiting the English taste and requirements, M. Vizetelly has the following apposite remarks in his useful little work "The Wines of the World:"—

"Few of us can altogether escape from this compound —the ordinary hotel and refreshment-room Sherry—however guarded we may be in the matter of what we drink. The finer wines, and some of the commoner natural varieties, which are gradually making their way in England, are of course, of a different character; still even the finest Sherries are plastered, and subjected to other manipulations, which latter, however, scarcely affect their purity. For instance, they are more or less sweetened and tinted with Dulce * and *vino de color* of the purest quality. In addition, every rearer of vines has his *soleras*, comprising his highest-class wines, which by age, care, and attention, have acquired alike body and character, and which he sparingly uses to mix with, and improve the quality of, newer and inferior vintages. These butts of stock wines are drawn from in equal proportions, and replenished from time to time by promising wines of younger growth. In these *soleras*, all individuality of origin, and year of vintage, become in a measure obliterated."

"When newly made up from numerous small selections, they represent simply a mixture of an infinite variety of wines. Old soleras, on the other hand, represents a *mélange* of small residues from the wines of a considerable

* The Spanish name for a liqueur made from the juice of over-ripe grapes, with the addition of a strong spirit, to check fermentation.

number of years, of which the most recent, presents by far the largest proportion."

Amontillado.—The usual explanation as to the cause of the peculiar flavour of Amontillado wine is given in chapter 4, page 52. A different account of the matter has latterly found some acceptance among scientific men. The ethereal flavour in question is referred to the gradual action of the oxygen of the air on the alcohol in the wine, transforming part of such alcohol into *acetic* acid, and in the course of the transition, producing a body known as *aldehyde*—a half-way step as it were, between alcohol and acetic acid. This aldehyde has certainly much the same odour as that recognised as characteristic of Amontillado. It is remarkable also that some of the Greek wines, raised from vines not belonging to the Xeres variety, abound in Aldehyde. But it still remains a question why the produce of only certain vines and districts should develop aldehyde in a marked degree, seeing that *all* wines in maturing, must pass through the stage in which alcohol changes into acetic acid, after having first become aldehyde. In other words, a satisfactory reason seems to have not yet been given for the predominance of aldehyde in Amontillado wines specially.

It is in the wines of the Montilla district that the true Amontillado flavour is almost exclusively developed. These wines require, more than all the other wines of Spain, considerable age before arriving at perfection. But the very highest class Montilla seldom reaches any foreign country, the proprietors finding it more to their advantage to reserve it for blending with, and imparting character to common growths of the same district.

Manzanilla.—The Spanish word "Manzanilla," really means *Chamomile*; and so marked is thought to be the resemblance of the flavour of this wine to that of an infusion of chamomile, as to give rise to a mistaken belief, that chamomile flowers are put into the vat while the wine is fermenting. Manzanilla has, no doubt, a very peculiar flavour; it is an especially thin, dry, tonic wine, with a delicate medicinal odour or taste, but whatever peculiarities it may have, these are due to the character of the soil in which the grape is grown, and not to artificial additions in the process of making, or to a variety of vine. That the latter is not the case, is proved by the fact that the wines of the Xeres district, produced from the same kind of grape, have no trace of the true Manzanilla flavour.

Genuine Manzanilla is always a perfectly fermented wine—pale, thin, and aromatic. It is free from all heat on the palate, though containing sufficient natural spirit to preserve it in good and improving condition for a great many years. Every year of age adds so much to its value, as to raise the price to double and triple the amount for which a young wine of the same original quality can be had. A well matured wine should be supplied in this country, at from 33/- to 40/- a dozen.

Alleged unwholesomeness of Sherry.—On this important and interesting question, M. Vizetelly has published in his series of useful works the following remarks, which we have no hesitation in quoting, almost unaltered, as a valuable pendant to the matters treated of in the present chapter:—

"Sherry, as exported, is generally a blended wine, composed in the majority of instances of wines of several distinct types. Recent vintages have character imparted to them by an admixture of some fine old variety, which again will have its pungency subdued by a moderate addition of *dulce*, (*see* page 154), while a touch of *vino de color*, (*see* also page 154), if fine and old, will not only impart the required tint but improve the flavour. *Aguardiente*, a colourless spirit distilled from the grape, is added in a greater or less degree according to the character of the wine, which now undergoes the process of fining with the white of eggs and fullers' earth. When perfectly clean and bright it is drawn off into fresh casks, which if used for the first time will have undergone a thorough steaming on leaving the cooperage. Afterwards the casks remain filled with hard water for three months, are then steamed again, and subsequently filled up with common wine for another three months, when they are considered thoroughly seasoned.

"The blending of Sherries is a most delicate operation. It is not sufficient to be a good judge of wine generally, and to be in possession of an excellent stock, in order to become a successful shipper; it is requisite to have the taste and judgment that will enable you to blend your wines artistically. A writer on the subject has aptly remarked, that you may give a score of men the requisite materials, but only one of them will be able to produce a picture; and so it is with reference to the more delicately blended types of Sherry. The endless varieties of this wine to be found in a well-stocked bodega may be com-

pared to so many musical notes, which in proportion to the skill with which they are arranged conduce to a harmonious and successful result.

"Everyone will remember the outcry raised not long ago against Sherry, chiefly on the part of testimonial-furnishing doctors, always ready to court publicity by rushing into print under the pretence of enlightening an unintelligent public. It was paraded in the papers, as though it were a new discovery, that gypsum (sulphate of lime) was used when making the wine, and the inference was drawn that Sherry is necessarily injurious to health. Among other highly-coloured statements was one, made with an air of authority, to the effect that the grapes for each butt of Sherry invariably had from 30 to 40 lbs. of gypsum thrown over them previous to their being trodden and pressed, the main effect of which was to transform the tartar of the must into sulphate of potash, an aperient salt, 3 to 14 lbs. of which were stated to be contained in every butt of this popular wine.

"The public knowing nothing of the motive—an interested one—which prompted these attacks upon Sherry, naturally grew alarmed, and for a time the subject formed a common topic of conversation at dinner tables, where you found Sherry declined with thanks by the lady at your side. Middle-aged gentlemen, too, perfectly hale and hearty on their daily pint of Sherry, fancied that perhaps for them a day of reckoning might be near. The alarm, however, soon subsided, and people returned to their own love: still it is none the less desirable that the truth of the matter should be made known, and the public mind disabused of any latent fears on the subject.

"I, (M. V.), during my sojourn at Jersey, paid particular attention to this plastering question, saw the gypsum applied in almost a hundred instances, and questioned the overseers in scores of vineyards. I may state, as within my own knowledge, that gypsum is by no means invariably used in the making of Sherry, some thousands of butts being yearly produced without a particle of this substance. I have moreover ascertained, by personal observation, that when gypsum is employed, only a small quantity, a few lbs. per butt of 108 gallons, is used. Undoubtedly, gypsum is applied in the great majority of instances; still I can confidently assert that 6 lbs. per butt may be regarded as the extreme quantity used in dry seasons, and that double this amount, or perhaps rather more, would be the average for years when great dampness prevails. I shall now show that the largest quantity ever asserted to be used is really quite harmless.

"The detractors of Sherry can hardly be aware that the superiority of Burton bitter beer is owing to the large amount of gypsum contained in the water of the Trent,* and that quite as much of this innocuous substance enters into a pint and a half of that excellent beverage as into any bottle of Sherry in existence. In one respect gypsum acts with regard to the fermentation of beer precisely in the same way as it acts with

* This statement is not quite correct: the water used in brewing at Burton is derived chiefly from wells on the brewery premises, and any deficiency in hardness is supplied artificially. Besides, the excellence of the beer is in a great degree the result of the fine materials used and the splendid management displayed.—(Editor.)

reference to that of wine—that is to say, it checks over-acidity by counteracting the influence of the excess of nitrogenous matter present alike in wort and must, and which troubles brewers of bitter beer in the form of gluten, and Xeres wine growers in the form of albumen. So important an element indeed is gypsum in the brewing of good beer that many Scotch and other brewers add it in considerable quantities to the water they employ, should there be any want of hardness.

"Not merely is gypsum largely used by brewers, but *all* the wine growers of the south of France have recourse to it. Some years ago proceedings were taken against the latter on the plea that the use of gypsum constituted an adulteration, and eventually the matter came on appeal before the tribunal at Montpellier, which appointed three distinguished chemists, who had made wine their special study, to investigate the subject and report upon it. Singularly enough these experts made their experiments on wine containing as nearly as possible the same proportion of gypsum as enters, according to the most extravagant estimate, into a butt of Sherry, viz., 40 lbs. to the 108 gallons.

"The French chemists reported, that plastered wine contains no new mineral substance (no mineral substance other than that taken up by the plant from the soil): that the amount of plaster added could have no injurious result, as it became completely transformed during the process of fermentation, &c. into sulphate of potash, and that the only objection that could be urged against sulphate of potash was, that it is slightly aperient, as indeed are all the natural tartrates themselves upon

which the gypsum acts. Brillat Savarin, the great French cook, had a fanciful objection to grapes, saying that he did not care to take his wine in pills. Here the operation is reversed; the pills are taken in the wine.

"As the result of the examination into the subject generally by the local courts and by a commission appointed by the Imperial government, it was decided that plastered wines which contained no larger a quantity of sulphate of potash than at the rate of 65 grains to the quart, which is more than double the quantity found in the samples analysed by the French chemists, might be consumed without detriment to health; so that, at the present day, fully two-thirds of all the wine made in France is produced from grapes that have undergone the plastering process."

[It should be remarked here that the real question with the wine drinker is not "how much adulteration can my system bear without sensible injury?" but rather, "why should I have to drink a wine that is in the least degree other than natural and pure, a little added spirit for keeping purposes alone excepted?" Now, as shown in Chapter 3, the worst effect of the use of plaster of Paris is to substitute sulphate of potash, a decidedly nauseous aperient salt, for the natural tartrate of potash present in the wine. So that, unless a certain amount of plastering can be shown to be indispensable in the successful making of certain wines—which is, to say the least, extremely doubtful—then no defence of the practice, however ingenious, is admissible, and the whole system must be pronounced a fraud.]

"As to the *sulphuring* which Sherry undergoes, nothing

more objectionable appears to be done in this direction, at least as regards wines of the better class, than the burning of a match inside the empty casks. If the sulphurous acid thus engendered be carefully driven out by washing or steaming before the casks are filled with wine, no harm or ill-flavor can possibly result."

It is certain that a very cheap Sherry cannot be one of good quality: this wine requires keeping three or four years before it is suitable for drinking, and a great increase of the original cost is of course thus entailed. The low-priced Sherries in the market are necessarily young, immature wines, liable to get out of order on being moved, through the setting up anew of checked fermentation. It is only by the addition of spirit that these crude, undeveloped Sherries can be kept in drinking order; and there would appear to be much truth in the statement on the part of the producers abroad, that it is by the special desire of the importers in this country that so great a quantity of spirit is used.

"If instead of Sherries being shipped when they are only a year old, they were kept another three years, and the absurd practice of fining were dispensed with, they might be safely exported with the addition of not more than one sixth of the quantity of spirit now put into them; of course, a higher price would have to be paid for wines treated in this rational and judicious manner, and in order to keep abreast of the keen competition now prevailing, our home dealers are obliged to sell at as low a price as of from £12 to £14 per butt, or at nearly half the rate requiring to be charged for a really pure, light brandied Sherry."

"As there can no longer be any doubt that natural Sherry will frequently develop as much as 30 per cent. or more of spirit, by continued, slow fermentation, in wood or in bottle, it would seem only fair to alter the existing tariff of customs duties on wine, and to raise the limit for the lower duty, of a shilling per gallon, from 26° to 30° or 35° proof spirit; * were this done, the wines of Spain and Portugal would be placed on an equitable footing with those of France and Germany, and the Spanish and Portuguese markets be thus opened on favourable terms to our home woollen and other manufacturers."

PORT.

It is frequently asserted and believed that logwood and elderberries are used to impart colour to Port wine. But except as regards a wholly fictitious compound, made up in this country in imitation of Port, there is really no ground for the statement above mentioned. A positive disproof, as regards logwood, is furnished by the fact that a purple tint, resembling that of natural Port, cannot be got from logwood when put into liquids containing any portion of free acid, and no wine is without acid. In order that a purple colour should be ensured, it would be necessary to deal with an alkaline liquid, that is, one having some predominance of potash, soda, &c., in it, and that is never the case in pure wine. It is an equally great mistake, as already explained, (*see* page 64), to suppose that elderberries are employed by the foreign

* This is now done by the treaty with Spain raising the one shilling duty limit to 30° proof spirit.

vintners to any extent for the colouration of Port, or other red wines, that is, wines of average quality.

One great disadvantage under which shippers of Port labour, is the frequent change of fashion in the *style* of wine demanded in England. So constant are the changes, and so endless are the varieties now-a-days, that it has been said, there are almost as many styles of Port wine, as there are shades of ribbon in a draper's shop. At one time, deep coloured, heavy wines will be in vogue, at another time, a wine paler in colour, and lighter in body, but rich in flavour is preferred; sometimes dry wines are in request, and latterly the fashion has set in for thin wines, of a light tawny tint, the consequence of remaining long in the wood—the kind of wines, in fact, the Oporto shippers invariably drink themselves. But then, these wines are often called for at a ridiculously-cheap rate, less in fact, than one fourth of the sum that wines of the required age would cost the shipper himself, who can only meet the demand by blending together a red and a white Port. This blending is perfectly harmless, and the consumer comforts himself with the belief that he has acquired a tawny Port of fabulous age, at an absurdly low cost. Of course, reference is here made to *cheap* tawny Ports, and not those good wines which have mellowed in flavour, and lost their colour in the course of a quarter of a century of ripening, and which are only to be obtained by paying a commensurate price for them.

With such varying tastes to be ministered to, Port wine must necessarily be, in some measure, a work of art. The happy owners of Port in perfection, are popularly supposed to be those persons who have inherited a cellar of wine,

laid down some half century ago, by a grandfather, or great uncle, but there is really no reason why a man should not lay down Port wine that may be used, in fine condition, for his own drinking, as well as for the benefit of his descendants.

An authority on the subject, Mr. T. G. Shaw, has pointed out, that a wine produced from well-ripened, but not over-ripened grapes, with fine, full firmness, no hard stalkiness or dryness, and sufficient richness, is certain to go forward improving, *with this great advantage, that it does not absolutely require long keeping in bottle.* It is necessary, however, that it should be allowed to mature, and get rid of its coarse parts in the wood, for which object it should be kept two or three years before being shipped, and should, moreover, be frequently racked It might then be bottled three months after it reaches London, and in two years' time it will be better than it would become if bottled young, and kept ten years in bin—better, because a long sojourn in contact with the black cork and crust, must deteriorate the bouquet. A heavy crust, and dark-stained cork, are often regarded with misplaced veneration, for their absence in a wine that has been bottled some time may be taken as a proof that the wine was ripe for bottling. A firm-holding crust is of the highest importance, and new wine usually gives a slippery crust, the grosser parts falling away too rapidly, while the deposit in older and well racked wines forms more slowly, and takes better hold. Mr. Shaw is decidedly of opinion, that the richer and fuller a vintage may be, the longer it is necessary for the wine to remain in wood,

in order that the saccharine it contains may be reduced in bulk by fermentation.

Connoisseurs who have lived at Oporto, and enjoyed the opportunity of drinking at the tables of the shippers the fine old wines, which, having been kept a considerable number of years in the wood, have become thereby as tawny as an ordinary deep-coloured Sherry, will as a rule, prefer wine of this description to the choicest *bottled* Port that can be offered to them.

With regard to the cellar in which Port wine is laid down, it should be noted that, whilst a cool, equable temperature, and good ventilation are necessary, it is essential that the cellar should not be too cold. Port is very easily chilled, its constituent parts, owing to the amount of colouring matter, &c. in them requiring more heat than any other wine to remain in solution. At the same time, the old plan of burying it in sawdust, is to be shunned, as, if this gets damp, it generates a degree of heat, far from conducive to improvement.

Properly constructed bins are of especial importance in the matter of Port, a first outlay being repaid in a very short time by the finer condition of the wine, and the facility of access to any part of the stock, without risk of mistake or breakage.

The publisher of this work will be happy to furnish estimates, on application, of the cost of every description of improved wine bin, which, through his trade connections, he is able to supply at greatly reduced prices, as well as every other requisite of the wine merchant's business.

CHAMPAGNE AND OTHER SPARKLING WINES.

As indicated in our remarks on Champagne in Chapter 2, part 2, it is really the amount of sweet liqueur (capillaire), added before the final bottling, that constitutes the difference between a sweet and a rich effervescing wine. It is to the same agent also that the degree of alcoholic strength of such wines is chiefly due, the syrup added furnishing the material for the generation of spirit by slow fermentation. Dry Champagnes are, on the whole, more likely to be genuine and of good quality than the sweet kinds, for the liqueur put into the latter almost entirely masks all original character and flavour.

A highly-sugared wine gives rise to so much gas as to force out the cork when a bottle is opened with great violence and display of froth. This pleases the uncritical drinker, but it will be observed that a short time after this tumultuous effervescence has subsided, the wine left in the glass becomes flat and unpalatable. A naturally dry or only moderately sweet Champagne, on the other hand, although it sparkles and froths much less on being poured out, yet retains its sparkling property, and its agreeable taste and bouquet long after the wine has been poured into the glass. The fact is, that the carbonic acid gas present in non-sugared wines is the product of slow fermentation of the natural saccharine of the grape-juice itself, and being slowly evolved, the gas is absorbed by the liquid, and parts from it very gradually when the cork is withdrawn; whereas the gas engendered by large quantities of added liqueur accumulates in the space under the cork, ready to rush out noisily and explosively as soon as the pressure is removed; there is hardly any

better rough general test of the character of a sparkling wine than this behaviour as respects effervescence on pouring out.

It must be borne in mind also that much sweetness conceals delicate flavour and bouquet, and renders it almost impossible to form a judgment as to the natural qualities of the wine.

England imports the best and driest of all the Champagnes prepared for foreign markets, and Germany the sweetest. Where a sparkling wine is drunk at meals, as is usually the case in England, great sweetness would be a great and well founded objection. With wines intended for consumption at dessert or between meals, lusciousness of flavour is rather a recommendation to most consumers.

Good Champagne is as a rule of a pale straw colour, free from yellowish tinge. The red and pink hue at one time, and even still occasionally fashionable, should be regarded as a defect in the manufacture, arising from a portion of the colouring matter of the grape skins having been suffered to tincture the wine; of course a reddish tinge can easily be given to Champagne at any time if desired, by adding in the process of making a little ordinary deep red wine.

Physicians of the enlightened school are now nearly unanimous in advising good Champagne for the relief of various forms of debility, sickness, and neuralgia, and there can be no doubt that almost magical comfort is often inspired by adopting this agreeable remedy.

Customers should be frequently reminded that none but excessively sweet Champagnes or other sparkling

wines will bear being iced beyond a moderate degree. Owing to ignorance, or neglect of this fact, dissatisfaction with the goods supplied is apt to be expressed where the fault really lies with the consumer; a fine dry Champagne is utterly ruined by too much cold. About 50° Fah. is as low as any but the sweetest wines should be cooled, if flavour and bouquet are to be preserved.

M. Vizetelly remarks that consumers of Champagne, if wise, would profit by the circumstance that quality has not the effect of causing a rise in prices; and that if they were bent on drinking their favourite wine in perfection, as it is met with at the dinner tables of the principal manufacturers who only put old wines of good vintages before their guests, they would lay down Champagnes of good years in the same way as the choicer vintages of Port, Burgundy and Bordeaux are laid down. The Champagne of 1874 for instance, was a wine of the description just mentioned, with all its finer vinous qualities well developed, and consequently needing age to attain not merely the soundness but the refinement of flavour pertaining to a high-class sparkling wine. Instead of being drunk a few months after it was shipped in the spring and summer of 1877, as was the fate of so much of the wine in question, it needed being kept for three years at the very least to become even moderately sound and perfect in taste.

If well laid down in a proper cellar, good Champagne will go on improving for ten years or more. The cellar should be dry and exceedingly cool, only moderately well lighted, but thoroughly and continuously ventilated; of course the bottles must be placed on their sides to prevent

the corks shrinking. Iron wine bins are the best. In putting the Champagne into bins the bottles should be held by the necks and slided into their places softly and dexterously. Patent slide bins are now largely used for the special purpose of storing Champagne and other sparkling wines. Estimates can be had of the publisher.

Sparkling Saumur.—After the produce of the Champagne district, Anjou is the French province which ranks next in importance for the supply of sparkling wines. The so-called Saumur wines from the banks of the river Loire, are largely consigned to the English and other markets, labelled Crême de Bouzy, Sillery, Ay, Mousseux, Cartes-Noires, Blanches, and the like, while the casks are branded with the names of imaginary firms supposed to be stationed at Rheims or Epernay. Notwithstanding this element of fiction, the sparkling wines produced in and around Saumur are really excellent, and improve much by being kept a few years.

There is not of course in them the lightness and delicacy so characteristic of the Champagnes from the department of the Marne, nor are they so dear as the latter. But Saumur, is as a rule a genuine, wholesome wine, which sparkles nicely, and with a little age acquires a most agreeable flavour. Saint Florent is the most renowned place of production of sparkling Saumur.

Sparkling Burgundy, &c.—Sparkling wines are made to a considerable extent in Burgundy, especially at Beaune, Nuits and Dijon. These wines are for the most part heavier and stronger than the produce of the Marne district; still both the red and the white kinds of

sparkling Burgundy, when of good quality, are to be recommended for their dry flavour and refreshing character.

Among the principal manufacturers may be mentioned, André and Voillot of Beaune; Louis Latour also of Beaune, Maire et fils, Laboaré-Gontard and Geiseweiller et fils of Nuits, Marez and Liger Belair of Nuits and Vôsne, and Regnier of Dijon.

Saint Péray is an excellent sparkling wine from the south of France. It is manufactured in much the same manner as Champagne, but there are one or two slight variations. For a wine to be sparkling it is requisite that it should ferment in bottle, a result obtained by bottling it while it contains a certain undeveloped proportion of alcohol and carbonic acid, previously represented by so much sugar, of which these are the component parts. This ingredient (sugar) has frequently to be added to the Champagne wines, to render them sparkling, but the wine of St. Péray in its natural state, contains so much sugar that any addition would be injurious. This excess of sugar enables the manufacturer at St. Péray to dispense with some of the operations necessary in the fabrication of Champagne, which after fermenting in the cask requires a second fermentation to be excited in the bottle, whereas a St. Péray wine ferments only once, being bottled immediately after it comes from the wine press, and is thus in a sense a more natural and genuine wine than Champagne. So sweet indeed is the must of the St. Péray grapes that it is frequently found necessary to reduce its own lusciousness by mixing it with some old dry wine. On the grounds of economy only, St. Péray

would be preferred by many to Champagne, as one glass of it will go as far towards *elevating* a person as three of ordinary Champagne.

Sparkling Hock and Moselle.—All wines can by proper management be rendered sparkling, although it is only certain growths devoid of earthy or heavy flavour, and possessed of a light delicate body that will bear transforming into acceptable effervescents. At one time the chief aim of the makers of sparkling Hock was to cause thin produce to resemble Champagne as closely as possible, and with this object syrup was largely employed; but at the present day the demand in the English market is chiefly for sparkling Hocks of a dry kind, and the mode of preparation has altered accordingly.

The sparkling Moselle destined for England is often impregnated purposely with extract of elder flowers, which gives the well-known Muscatel flavour and odour, although the liking for a wine thus artificially perfumed is now on the wane. Effervescing Rhine and Moselle wines of the highest class have a marked and refined flavour, together with a very decided natural bouquet; besides they retain their sparkling property for a long time after being uncorked, and appear to the taste as light, if not quite so delicate as the finer Champagnes; but this is not really the case, as sparkling Hocks possess greater body than even the heaviest Champagnes, and cannot be drank therefore with equal freedom.

The great cheapness of sparkling Hock and Moselle is a strong incentive to the sale of these wines in all parts of the world. In England the computed consumption at present is about two million of bottles annually.

The process pursued in the manufacture of sparkling Hocks is essentially the same as that followed with regard to Champagne. As the amount of the natural saccharine in the grapes grown in the Rhine and Moselle districts is but small, a certain addition of syrup is *always* made to the wine before bottling, so as to ensure the desired effervescence; whereas in the making of Champagne, sugar is not invariably employed. After Hock has been bottled it is allowed to remain in a cool cellar for eighteen months or two years, being constantly shaken during that period in order to force the sediment to deposit itself near to the cork. By this time the added as well as the natural sugar contained in the wine has become for the most part converted into alcohol and carbonic acid gas; after the sediment has been expelled from the bottle, the operation of dosing or flavouring the wine takes place.

During the Franco-Prussian war of 1870, a great impetus was given to the manufacture of German sparkling wines, when the district of Champagne was in a measure closed to the outside world. At this period the less scrupulous makers, led on by dishonest speculators, forged the brands on the casks and the labels of the great Rheims and Epernay firms, and sent forth sparkling wines of their own production to the four quarters of the glob e as genuine Champagnes of the highest class. The respectable houses acted differently, and as the event proved, with better policy; for by maintaining their own labels and brands they extended the market for their produces, causing German sparkling wines to be introduced under their true names into places they had never reached before, the result being a

considerable increase on the annual demand, even after the stores of the Champagne manufacturers were again open to all the world.

Owing to this increased demand and the deficient supply of suitable Rhine wines at a moderate price, the makers of sparkling Hock are compelled to buy much of their raw wine at a distance, and are to day large purchasers of the growths of the Palatinate, which are less delicate than the vintages of the Rheingau, besides being deficient in the fine aroma that distinguishes genuine Hock.

Sparkling Voslau is a Hungarian wine of a very good kind, now becoming popular in England.

The sparkling wines of other parts of the world, however good in their way, do not reach England in any quantity and need not therefore be described here.

REFERENCE LIST OF THE PRINCIPAL WINES CONSUMED AT STRENGTH WHERE KNOWN, AND A SHORT ACCOUNT OF

FRANCE.

FIRST-CLASS WINES.

NAME.	Colour.	Place of Production.
Chambertin	Red	Côte d'Or
Clos-Vougeot	do.	do.
Corton	do.	do.
La Tache	do.	do.
Richebourg	do.	do.
Romanée Conti	do.	do.
St. Georges	do.	do.
Château Margaux	do.	Gironde
Haut Brion	do.	do.
Lafitte	do.	do.
Latour	do.	do.
Clos du Tart	do.	Côte d'Or
Morgeot	do.	do.
Musigny	do.	do.
Premaux (1st growths.) ...	do.	do.
Muret	do.	La Drôme
Racoale	do.	do.
Red Hermitage	do.	do.

THE PRESENT TIME IN ENGLAND, WITH THE AVERAGE THE CHARACTER AND PROPERTIES OF EACH KIND.

FRANCE.

FIRST-CLASS WINES.

Strength in degrees of Proof Spirit.	Character, &c.
The average strength of the *best* Clarets may be taken as about 22·5°.	Finest red wines in the world, of the less alcoholic character; rich, yet delicate *bouquet;* purple colour, with body and spirit sufficient to refresh and invigorate.
... ...	Fine colour and bouquet, not so warm as Burgundy, with taste of the violet.
Average of Red Burgundies 24·5°, of White 19°	*Burgundies;* more body and fulness of flavour than the preceding, but closely resembling them in aroma and other qualities.
24·0°	Rhone wines of the Burgundy kind, darker than the last mentioned. Red Hermitage, the most noted of these, has a good body, and the flavour of the raspberry.

FRANCE—FIRST

NAME.	Colour.	Place of Production.
Ay	White	Marne
Sillery	do.	do.
Dizy...	do.	do.
Epernay (Closet)	do.	do.
Haut Villiers	do.	do.
Pierry	do.	do.
Barsac	do.	Gironde
Château Grillet	do.	do.
Sauterne	do.	do.
St. Bris	do.	do.
Hermitage	do.	Rhone
Hermitage de Paille ...	do.	do.
		SECOND CLASS
Côte Rotie	Red	do.
Bouzy	do.	Mamo
Mailly	do.	Marne
St. Thierry	do.	do.
Chablis	White	Yonne

CLASS WINES—*continued.*

Strength in degrees of Proof Spirit.	Character, &c.
...	Effervescing—bright in colour.
...	Still, dry, of amber tint.
... ...	Best of the white Champagne wines, all of first quality, differing only in colour and degree of effervescence.
20·4 ... 26° ...	Still wines, lightish brown tint, rather sweet taste, agreeable aroma.
24·2	Full of body, spirit and perfume; the finest of all white wines.
...	Dry and delicate.
WINES.	
...	Fine colour and violet perfume, slightly bitter.
23·5°	Red wines of Champagne.
27°	Dry, thin, delicate.

FRANCE—SECOND CLASS

NAME.	Colour.	Place of Production.
Beaune	Red	Côte d'Or
Chambolle	do.	do.
Pomard	do.	do.
Volnay	do.	do.
Moulin à Vent	do.	Savonne et Loire
Hermitage, 2nd growth ...	do.	Gironde
Larose	do.	do.
Leoville	do.	do.
Rozan	do.	do.
Cosperon	do.	Pyrenées-Orientales
Masdeu	do.	do.
Roussillon	do.	do.
Coteau Brulé	do.	Vaucluse
Charmes	White	Côte d'Or
Meursault	do.	do.
La Perrière	do.	do.
St. Jean	do.	Ardêche
St. Peray	do.	do.
Frontiguac	do.	Herault
Lunal Mazet	do.	do.
Jurançon	do.	Basses Pyrenées

WINES—*continued.*

Strength in degrees of Proof Spirit.	Character, &c.
... ...	Excellent red Burgundies, but little inferior to first growths.
...	Good.
21·5°	Good.
... ...	Good.
... ... 36·5°	Good.
...	Good.
... ...	White Burgundies, highly esteemed in France.
... ...	Delicate, sparkling and still—agreeable flavour.
... ...	Sweet, rich, luscious.
...	Agreeable perfume of the truffle.

FRANCE—THIRD

NAME.	Colour.	Place of Production.
Dizy	Red	Marne
Epernay	do.	do.
Haut Villiers	do.	do.
Castelnau	do.	Gironde
Margaux	do.	do.
Pouillac	do.	do.
St. Estephe	do.	do.
St. Jullien	do.	do.
Chateauneuf	do.	Vaucluse
Frontiguac	White	Herault
Lunel	do.	do.
Cassis	do.	Bouches du Rhone
Roquevaise	do.	do.
Vins Creits	do.	do.
		SPAIN.
Amontillado Sherry ...	White	Andalusia
Lagrimas	do.	Malaga
		SECOND AND THIRD
Sherry	Light & dark brown	Xeres

CLASS WINES.

Strength in degrees of Proof Spirit.	Character, &c.
... ...	Champagne of fair quality; light and agreeable.
... ...	All good wines of agreeable flavour.
...	Good keeping wine.
... ...	Second growths of those rich white wines.
... ...	Rich, sweet, boiled wines of good quality.

FIRST CLASS WINES.

...	Dry, delicate, slightly bitter.
...	Thick, luscious.

CLASS WINES.

...	

SPAIN—SECOND AND THIRD

NAME.	Colour.	Place of Production.
Sherry, matured	Light brown, pale & brown	Xeres de la Trontera
Benicarlo	Red	Benicarlo
Manzanilla	Light brown	Andalusian
Montilla	do.	Cordova
Malaga	do.	Malaga
Rota Tent	Red	Andalusia
Tarragona	do.	Catalonia
Val de Penas	do.	New Castile
Alicant	do.	Valentia
San Lucar	do.	Andalusia

PORT

Port	do.	Alto Douro
Ditto, natural	do.	do.
Bucellas	White	Near Lisbon
Calcavellos, or Lisbon ...	do.	Calcavellos

CLASS WINES—*continued.*

Strength in degrees of Proof Spirit.	Character, &c.
36·5° 30·5°	Ordinary Sherry.
...	Strong; good quality.
35°	Dry, thin, bitter; keeps badly.
35°	Dry; good bouquet and flavour.
...	Luscious, with burnt flavour.
...	Rich, luscious; little spirit.
...	Resembles Port, but with greatly inferior bouquet, &c.—much used for invalids.
...	Light, muscadine.
...	Good.
UGAL.	
38° 27°	Variable; too well known to require comment.
...	Little now consumed in England; rather hot; tasting, when pure, like Barsac.
...	Sweet; fair quality; not much imported of late years.

GERMANY—FIRST

NAME.	Colour.	Place of Production.
Johannisberger	White	Johannisberg
Hochheimer...	do.	Spire-on-Maine
Steinberger	do.	Rheingau
Steinberger	do.	do.

SECOND

Brauneberger	do.	Trêves District, on the Moselle,
Erbacher	do.	near Bonn
Niersteiner	do.	Mayence District
Hattenheimer	do.	do.
Laubenheimer	do.	do.
Liebfraumilch	do.	Worms
Marcobrunner	do.	Rhine District
Piesport	do.	Moselle District
Rauenthaler...	do.	Rhine District
Rudesheimer	do.	Rheingau

CLASS WINES.

Strength in degrees of Proof Spirit.	Character, &c.
...	Dry, delicate; prince of Hocks.
...	Gives its name to the word *Hock*—prime quality.
...	Almost equal to Johannisberg.
23°	Second growths.

CLASS WINES.

24°	High quality, Moselle wine.
...	Good.
17°	Light, delicate; rather weak.
23°	Light, delicate.
...	Light, delicate.
...	Good wine, with fine flavour and body.
23·2°	Good wine, with fine flavour and body.
...	Good, rather strong.
...	Good wine, with fine flavour and body
...	Very fine growth; a noted Hock.

GERMANY—SECOND CLASS

NAME.	Colour.	Place of Production.
Steinwein	White	Wûrtzberg
Scharzberger	do.	Trêves District, Moselle
Sparkling Hock	do.	Rhine District.
Sparkling Moselle	do.	Moselle District

AUSTRIA AND

Vôslau ... ... Steinberg	Red and white	Austria
Carlowitz	do.	Sclavonia
Erlau	do.	Hungary
Somlau (Auslese)	Red	do.
Tokay	do.	do.

ITA

Asti	Red	Piedmont
Chianti	do.	Tuscany
Capri	do.	Naples
Do.	White	do.

WINES—*continued.*

Strength in degrees of Proof Spirit.	Character, &c.
...	Choice wines; scarce.
...	First quality, Moselle wine.
...	Variable.
...	Variable.
HUNGARY.	
...	Moderately good, with body and colour.
23·2°	Best qualities in great demand; of the same general character as Côte Rotie.
24·5°	Good.
...	Very good.
20°	Luscious, non-alcoholic; peculiar flavour; very scarce.
LY.	
...	Strong, durable.
...	Excellent.
...	Good, strong.
...	Good, strong.

ITALY—

NAME.	Colour.	Place of Production.
Lachryma Christi	Red	Naples (Mount Vesuvius)
Monte Pulciano	do.	Tuscany
Vermuth	do.	Elba
Vino Santo	Red & white	The Veronese
Marsala	Deep brown	Sicily
Marsala Bronté	do.	do.

GRE

Santorin	Red & white	Santorin
Lachrymae Christi	do.	Mount Hymet
Visanto	do.	Visanto
St. Elie	do.	St. Elie
Zante	do.	Zante
And numerous others imported chiefly by Denman & Co., London.		

continued.

Strength in degrees of Proof Spirit.	Character, &c.
...	Celebrated, rich, muscadine; of fine flavour and perfume.
...	First class; sweetish.
...	Cordial, prepared with wormwood.
...	Good.
36° 33·5°	Strong; pure; like sherry
ECE.	
27°	Light; good bouquet.
18°	Sweet, luscious.
...	Sweet, luscious.
27°	Light; good bouquet; dry pale.
...	Thin, delicate.

ATLANTIC

NAME.	Colour.	Place of Production.
Madeira	Dark brown	Madeira

AFR

Cape...	Light brown and white	Cape Colony
Constantia	Dark brown and white	do.

AUSTR

Auldana	Red and white	Auldana
Cwarra	Red	Cwarra

ISLANDS.

Strength in degrees of Proof Spirit.	Character, &c.
39°	Stout, delicious flavour; well known wine, resembling the best Sherries.

ICA.

36·5°	Resembling Sherry; rather thin and spirituous.
...	Liqueur wines; luscious, costly.

ALIA.

22°	Improving wines, of fair quality.
26°	Improving wines, of fair quality.

NOTE ON THE ALCOHOLIC STRENGTH OF WINES, &c.

A good deal of uncertainty prevails in the minds of most persons not versed in chemistry or the practical valuation of the strength of wines and other intoxicating liquors, as to the exact meaning of such expressions as "percentage of alcohol" and "percentage of proof spirit." It may be useful, accordingly, to explain here that by the words alcohol, or absolute alcohol, is understood a spirit of the highest possible strength, unless where a standard of different strength is expressly referred to. The proportion of such alcohol contained in any given liquid is determined both by weight and measure, but, except for chemical purposes, the quantity by measure, or volume, is that usually indicated as the most convenient. When it is stated, for instance, that a particular wine contains 15 per cent. of alcohol by weight, what is meant is that in every one hundred parts by weight—lbs., ounces, &c.—of that wine, there are contained 15 lbs., or ounces, &c. of alcohol. Similarly, when it is stated that a wine contains 15 per cent. of alcohol by measure or volume, the inference is that there are in every hundred gallons, pints, &c. of such wine 15 gallons, or pints, &c. of alcohol

It is not of course implied, in either of these modes of expression, that the alcohol present exists in the liquid in a pure or absolute condition. All that is signified is, that the materials out of which so much pure alcohol could be prepared, if necessary, exist in the liquor.

The relation between absolute alcohol and the so-called "proof spirit" of the Excise or Customs is one which cannot be calculated with any exactness by mere arithmetical proportion Owing to the contraction of bulk that takes place when strong alcohol is diluted with water, a table showing the true correspondences in question, as determined by experiment for each case, must be referred to when precision is required. For rough purposes, an approach to correctness may be obtained by the following easy operation, when it is desired to know how much proof spirit per cent. corresponds to a given amount of alcohol by measure. Multiply the given percentage of alcohol by 2, and deduct one-eighth. Thus, 20 per cent. alcohol by measure corresponds nearly to 35 per cent. proof spirit, as computed in this manner—(35·4 is the exact proportion).

If it be wished, on the other hand, to arrive roughly at the percentage of alcohol, knowing the per cent. of proof spirit, it is only necessary to reverse the rule just given, that is, multiply by 4 and divide by 7. Thus, 35 (per cent. proof spirit) multiplied by 4 and divided by 7 gives 20 per cent. alcohol, as above.

The following Table of exact equivalents includes the entire range of strengths found in all natural or fortified wines.

TABLE SHOWING THE CORRESPONDENCES BETWEEN PER CENTS. (BY MEASURE) OF ALCOHOL AND PROOF SPIRIT.

Alcohol per cent.	Proof Spirit per cent.	Alcohol per cent.	Proof Spirit per cent.	Alcohol per cent.	Proof Spirit per cent.	Alcohol per cent.	Proof Spirit per cent.
5·0	8·8	7·8	13·7	10·6	18·6	13·4	23·9
5·1	8·9	7·9	13·9	10·7	18·8	13·5	24·1
5·2	9·2	8·0	14·0	10·8	19·1	13·6	24·4
5·3	9·4	8·1	14·2	10·9	19·2	13·7	24·5
5·4	9·5	8·2	14·3	11·0	19·4	13·8	24·7
5·5	9·6	8·3	14·6	11·1	19·6	13·9	24·8
5·6	9·9	8·4	14·7	11·2	19·7	14·0	25·0
5·7	10·0	8·5	14·9	11·3	19·9	14·1	25·2
5·8	10·2	8·6	15·0	11·4	20·1	14·2	25·3
5·9	10·4	8·7	15·2	11·5	20·3	14·3	25·5
6·0	10·6	8·8	15·5	11·6	20·5	14·4	25·7
6·1	10·7	8·9	15·6	11·7	20·6	14·5	25·8
6·2	10·9	9·0	15·8	11·8	20·8	14·6	26·0
6·3	11·1	9·1	15·9	11·9	20·9	14·7	26·2
6·4	11·2	9·2	16·1	12·0	21·1	14·8	26·3
6·5	11·5	9·3	16·3	12·1	21·3	14·9	26·5
6·6	11·6	9·4	16·5	12·2	21·4	15·0	26·7
6·7	11·8	9·5	16·7	12·3	21·6	15·1	26·8
6·8	11·9	9·6	16·8	12·4	21·8	15·2	27·0
6·9	12·2	9·7	17·0	12·5	22·0	15·3	27·1
7·0	12·3	9·8	17·2	12·6	22·3	15·4	27·3
7·1	12·5	9·9	17·4	12·7	22·5	15·5	27·5
7·2	12·6	10·0	17·6	12·8	22·7	15·6	27·8
7·3	12·9	10·1	17·7	12·9	22·9	15·7	28·0
7·4	13·0	10·2	17·9	13·0	23·1	15·8	28·1
7·5	13·1	10·3	18·2	13·1	23·3	15·9	28·3
7·6	13·3	10·4	18·3	13·2	23·5	16·0	28·5
7·7	13·5	10·5	18·5	13·3	23·7	16·1	28·6

TABLE SHOWING THE CORRESPONDENCES BETWEEN PER CENTS. (BY MEASURE) OF ALCOHOL AND PROOF SPIRIT.

(Continued).

Alcohol per cent.	Proof Spirit per cent.	Alcohol per cent.	Proof Spirit per cent.	Alcohol per cent.	Proof Spirit per cent.	Alcohol per cent.	Proof Spirit per cent
16·2	28·8	18·3	32·6	20·4	36·1	22·5	39·8
16·3	29·0	18·4	32·7	20·5	36·4	22·6	40·0
16·4	29·1	18·5	32·9	20·6	36·4	22·7	40·2
16·5	29·3	18·6	33·1	20·7	36·6	22·8	40·3
16·6	29·4	18·7	33·3	20·8	36·8	22·9	40·5
16·7	29·6	18·8	33·4	20·9	37·0	23·0	40·6
16·8	29·8	18·9	33·6	21·0	37·1	23·1	40·8
16·9	29·9	19·0	33·8	21·1	37·3	23·2	41·0
17·0	30·1	19·1	34·0	21·2	37·5	23·3	41·2
17·1	30·3	19·2	34·1	21·3	37·7	23·4	41·3
17·2	30·5	19·3	34·3	21·4	37·8	23·5	41·5
17·3	30·7	19·4	34·5	21·5	38·0	23·6	41·7
17·4	30·8	19·5	34·6	21·6	38·2	23·7	41·8
17·5	31·0	19·6	34·8	21·7	38·4	23·8	42·0
17·6	31·2	19·7	35·0	21·8	38·5	23·9	42·2
17·7	31·4	19·8	35·1	21·9	38·7	24·0	42·4
17·8	31·6	19·9	35·3	22·0	38·9	24·1	42·6
17·9	31·8	20·0	35·4	22·1	39·0	24·2	42·7
18·0	32·0	20·1	35·6	22·2	39·2	24·3	42·9
18·1	32·2	20·2	35·8	22·3	39·4	24·4	43·0
18·2	32·4	20·3	36·0	22·4	39·5		

WINE MEASURES.

Designation and Contents of Casks usually imported.

		Imperial Gallons.
Bucellas	Butt	117
Cape	Pipe	92
Claret	Hogshead	46
Hock	Aum	30
Lisbon	Butt	117
Madeira	Pipe	92
Marsala	Pipe	93
Do.	Hogshead	96
Do.	Quarter Cask	23
Masdeu	Pipe	115
Port	Pipe	115
Do.	Hogshead	57
Do.	Quarter Cask	28
Sherry	Butt	108
Do.	Hogshead	54
Do.	Quarter Cask	27
Teneriffe	Pipe	100

In France the standard measures are the *litre* and the *hectolitre* (100 litres). The litre is the unit measure. It corresponds to 1·76 pints English, roughly $1\frac{3}{4}$ pints. The hectolitre equals, therefore, 22 gallons exactly. In the various departments of France local measures, differing from the standard, are used; but the unit in all is the litre.

In Germany the same system of measures now prevails as in France, that is the litre (written by the Germans *liter*, 1·76 imp. pints) and the *hectoliter*, 22 gallons.

In Italy the litre system is now adopted for all liquid measures, viz., the *litro* (litre) and the *ettolitro* (hectolitre).

In Spain, the same as in France; but the litre is there called the *litro*, &c. The old measures are however still largely used, subject to reduction to the legal standard; of these the principal are, or were, the *arrolia* ($3\frac{1}{2}$ imp. galls.); the *cantaro*, varying according to locality from 3 to 5 gallons; the *tonnelada*, containing 100 cantaros.

In Portugal the French metric system prevails; that is the litre and hectolitre. The chief old measures are—the *almude* of Lisbon, 3·7 imp. galls.; the almude of Oporto, 5·6 galls. There are also the *basils*, *canadas*, *quantillas*, &c.

In Austria and Hungary the only standard of measure is the *eimer*, equal to about 17 imp. galls. Provincially there is also the *anthiel*, 11 galls.

THE SPIRIT MERCHANT.

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THE SPIRIT MERCHANT.

CHAPTER I.

OF SPIRITS AND SPIRITUOUS LIQUORS IN GENERAL—MANUFACTURE OF WHISKEY AND PLAIN BRITISH SPIRIT.

I. WHAT CONSTITUTES A SPIRITUOUS LIQUOR.—Any product obtained by the distillation of a fermented liquid and rendered fit for consumption as a beverage or stimulant, is termed generally a "spirituous or alcoholic liquor." The word "spirit" or "spirits" is also used with the same meaning, but this expression is not so distinctive as the former, inasmuch as alcohol, in many of its crude, undrinkable, forms, adapted only to purposes of the arts or manufactures, is classed, as well as spirituous liquors properly so called, under the common designation of "spirits."

Undistilled fermented liquids, such as beer, wine, cider, &c., however great their strength or the pro-

portion of alcohol which they may naturally contain mixed with their other ingredients, are never styled spirituous liquors or spirits.*

Various names, as whiskey, rum, brandy, &c., are given to spirituous liquors, according to the source or the nature of the materials from which they are derived; but while the flavor, odour, and to some extent the properties of each description of spirits are unlike, all these liquors agree in possessing *alcohol* as their chief or characteristic component. Thus, as will be more fully explained in another chapter, Brandy consists of alcohol and water, associated with small quantities of certain oils and ethers developed during the fermentation of the grape-juice or generated during the distillation of the fermented liquid. In Rum, the alcohol and water present are accompanied by oils and ethers of quite a different taste and smell from those existing in brandy, and which owe their peculiarity to molasses, the basis of the spirit. Whiskey, again, is dilute alcohol imbued with the special oils, &c., given out by malted grain. In almost all cases, the alcohol is the most valued and important ingredient of a spirituous liquor, except where such qualities as fineness and softness of flavour may be held to compensate for a lessened degree of alcoholic strength.

Spirituous liquors are consumed either in their

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* By the Act, 23 Vic. c. 27, s. 1, regulating the sale of wines in Refreshment houses, it is declared that *any* fermented liquor containing more than 40 per cent. of proof spirit shall be deemed spirits.

natural state as they come from the still, without any further treatment than the addition of water, the blending together of the produce of several distilleries yielding the same kind of spirit, and storage in casks for a shorter or longer time to undergo improvement by age; or they are first subjected to re-distillation in contact with certain flavouring substances, or more simply the process of *compounding*, which consists in the admixture of sweetening and flavouring matter to render the spirit weaker and milder and to gratify the palate. In this way is prepared the great diversity of liquors known as cordials, liqueurs, &c. *English gin* is now manufactured on the large scale by merely dissolving oil of juniper and other essential oils in plain spirit; but the finer kinds still continue to be made, as all gin was at one time, by re-distilling plain spirit in conjunction with juniper berries, carraway seeds, &c. A liquor so produced can hardly be termed, with propriety, a spirituous *compound* although that is the legal designation for "all spirits which shall have been re-distilled with any ingredient used in the compounding of spirits." Of course, the practical effects of the two processes are identical in every respect but that of delicacy of flavor. Further remarks on this subject will be found in the next chapter.

II. Of the various kinds of alcohol.—In common language the term Alcohol is applied exclusively to one kind of spirit—that obtained by the distillation of a fermented liquid. For the purposes of every-day life it is perhaps convenient to limit the designation in this way; but it is useful and instructive

to know that chemists give the name *alcohol* to a class of bodies belonging to the same general type or constituted on the same principle, and possessing certain properties and qualities similar to those of ordinary alcohol.

Wood Naphtha, for instance, is, chemically considered, a species of alcohol. *Fusel* or *Fousel Oil*—that which collects on the surface of distillers' feints and contaminates all but the very purest spirit,—is also classed as an alcohol. There are several other members of the family of alcohols, each bearing a title suggestive of its origin or its composition, but none of these has as yet found any application in the arts, or presented itself out of the domain of scientific research. The three well-known varieties above mentioned are named and distinguished as follows:—

Ethylic or Vinous Alcohol, the basis of spirits of wine, whiskey, rum, &c.; the intoxicating element in wine, beer, and other fermented liquors; is a colourless, limpid, and exceedingly volatile liquid, having a pungent but agreeable taste and odour; has the density of ·79385 at 60° Fah.;* boils at 173° Fah.; is highly inflammable, and burns without smoke unless the supply of air be deficient; mixes with

* By *density* is meant the same as specific gravity, that is, the weight of any portion of a solid or liquid compared with the weight of an *equal bulk* of water. Thus, a vessel which would hold 1000 grains' weight of pure water at the temperature of 60°, would hold only 794 grains of vinous alcohol at the same temperature. The weight of the alcohol is, therefore, to the weight of an equal bulk of water, in the proportion of 794 to 1000, or putting the values in the form of a fraction and turning the latter into a decimal, as ·794 is to 1.

water in all proportions; dissolves a great number of resins, oils, and other substances.

Methylic or Pyroxylic Alcohol, the basis of wood spirit or wood naphtha, obtained by the destructive distillation of hard woods; is a thin, colourless, volatile liquid, of peculiar and unpleasant odour, and of a burning nauseous taste; has the density of ·798 at 60° Fah.; boils at 150° Fah.; is very inflammable, even more so than vinous alcohol, and burns with a pale flame free from smoke; mixes with water in all proportions; has solvent powers almost equal to those of vinous alcohol, &c.

Amylic Alcohol, the basis of the so-called fusel oil, or oil of grain spirit, contained in distillers' *feints*, is a thin, transparent fluid, exhaling a powerful, persistent, and suffocating odour; has a hot, acrid flavor, and acts most injuriously on the system; density at 60° = ·8184; boiling point = 270°; does not readily ignite, but when warmed and set fire to, burns steadily with a bluish white flame. Is not miscible, except in a very slight degree with water; is to some extent useful as a solvent, but is not comparable in this respect to either ethylic or methylic alcohol.

All the distinctive qualities mentioned in the preceding description have reference to the alcohols only when the latter are in a state of purity and concentration. If these be in any degree diluted or impure, each of their characteristics will be modified to a greater or less extent, according to the nature and quantity of the foreign substances present.

Throughout the remainder of this work, the term

alcohol will be used in its ordinary sense, that is, to signify vinous spirit, the product of the distillation of a fermented liquid.

III. SOURCES OF ALCOHOL.—Experimental science has demonstrated that starch-sugar or grape-sugar is the only true source of vinous alcohol; that it is from a liquid consisting essentially of a solution of one of these sugars in water that alcohol can alone be obtained.

Grape-sugar and starch-sugar are substances of exactly similar composition and properties. The former may be extracted in large quantity from the juice of sweet grapes, and from honey, of which it forms the solid, crystalline, portion. It is abundantly contained also in various ripe fruits besides grapes, such as plums, cherries, pears, &c. The general name, grape-sugar, is given to the sweet matter derivable from each of these sources, because of its identity with the species of sugar found in grapes. Starch-sugar is so called from its being artificially produced by boiling starch with dilute sulphuric acid, or by digesting it with an infusion of malt as in the process of brewing. The product thus obtained cannot be in any respect distinguished from grape-sugar.

The combustion of wood in close vessels is the only known means of procuring wood-spirit economically and in any quantity, and on the other hand, the fermentation of solutions of starch or grape-sugar supplies the only available means of obtaining alcohol on the large scale. It is true that an eminent chemist, M. Berthelot, has pointed out a method of

producing alcohol *synthetically*, that is, by putting together its constituents, as opposed to the method of deriving it from the *de*composition of sugar. The process adopted by him was to agitate olefiant gas—one of the products of the destructive distillation of coal, and always present to a large extent in common coal gas—with strong sulphuric acid until a considerable bulk of the gas became absorbed, and then to dilute and distil the mixture. He succeeded in this way in obtaining, with tolerable facility, small quantities of weak, impure, alcohol.* But, the amount of scientific skill required in the execution of such an experiment, together with the expense, trouble, and uncertainty attending it, deprives it of any practical value beyond the illustration which it affords of the possibility of forming an organic compound by union of its elements.

It may, at first, be thought incorrect to state, that alcohol cannot be immediately derived from any other source than the decomposition of starch-sugar, when it is well-known that rum is prepared by fermenting ordinary cane-sugar or molasses, and also that the British distiller frequently employs one or other of these materials in the fabrication of spirits.

But, the explanation is, that cane sugar or the uncrystallizable cane-sugar-syrup present in molasses, is incapable of undergoing fermentation and yielding

* A report which was at one time circulated to the effect, that alcohol had been manufactured on an extensive scale at a gas factory in France, from one of the products of the combustion of coal, originated probably in an exaggeration of Berthelot's discovery.

alcohol, until it has been changed into grape-sugar. This is effected by the agency of a ferment, such as yeast, prior to the setting up of the direct fermentative process, which then transforms the altered sugar into alcohol and carbonic acid gas. A proof of the reality of this primary action of the yeast is furnished in the fact, that the density of the cane-sugar wort regularly increases for a short time after the addition of the yeast, instead of at once decreasing, as is the case with malt or grain wort, the sugar of which, existing already as starch-sugar, needs no preliminary modification. The cane-sugar, under the influence of the yeast, takes up and combines with an atom of water from the wort, and thus passes into the condition of starch-sugar. Every 171 lbs. of the cane-sugar present in the wort combines with 9 lbs. of water, forming together 180 lbs. of starch-sugar; and as the water thus appropriated, and now constituting part of the solid matter present, exists in a more condensed form than before, the gravity of the liquid must rise, while its quantity diminishes.

It thus appears that cane-sugar, when fully fermented, yields more than its own weight of alcohol and carbonic acid gas, inasmuch as 171 lbs. of this sugar, with 9 lbs. of water, form 180 lbs. of starch-sugar, which quantity of starch-sugar becomes resolved into 92 lbs. of alcohol and 88 lbs. of carbonic acid gas, together making up the entire weight of the sugar decomposed.

Pure or absolute alcohol is uniform in its composition and properties, from whatever source it may be

derived. All fermented liquids and spirituous liquors, as has already been observed, consist of alcohol mixed with water and other ingredients which are either naturally present or have been purposely added. The alcohol, when separated from its admixture with these substances and wholly deprived of water, is invariably the same. In order to obtain alcohol in a state of perfect concentration and purity, strong spirit (spirit of wine) must be digested with quick lime or some similar body having a greater affinity for water than the alcohol possesses, and the mixture distilled at a heat not exceeding that of boiling water. The liquid thus procured is used only in small quantities in chemical investigations.

IV. Varieties of British spirit.—The traders called by the excise, Distillers, are of two classes. 1st. Those who manufacture spirits from malt only. The produce in this case is delivered for sale, and is for the most part consumed as a beverage without any admixture or change of quality except that of a reduction of the strength with water. 2nd. Those who distil from materials consisting of various kinds of raw grain, with the necessary addition of a small quantity of malt, and occasionally from sugar, molasses, and treacle, either separately or in combination with malt and grain. The spirit so derived is applied to several purposes. A portion of it is diluted and consumed without further change as a beverage like pure malt spirit; it is a common practice, however, amongst dealers, to blend the less expensive raw grain or sugar spirit with a little highly flavoured

malt spirit, and to sell the mixture under the name of "malt spirit." Some of the raw grain or sugar spirit is disposed of at a high strength as "spirits of wine"* for use in the arts and manufactures, either in an unmixed state or when converted into *methylated spirit.* But the great bulk of the raw grain spirit made in this country is supplied to the traders styled Rectifiers, who, by certain processes which will be briefly described in a subsequent article, purify the spirit and then convert it into the liquors known as Gin, British Brandy, Cordials, &c.

Sugar or molasses spirit is objected to by the majority of rectifiers. They find that owing to its peculiar and persistent flavour, which it is impossible to remove without the loss attendant on repeated rectifications, it cannot be used with advantage in the making of gin or compounds.

Ordinary raw grain spirit, such as that obtained from barley, oats, and wheat, with the admixture of a little malt, is the best suited to the purposes of the rectifier.

Within the last few years, several attempts have been made in various parts of England, to extract by

* The name "spirits of wine" is given generally to any highly concentrated and rectified spirit short of absolute alcohol, from whatever materials derived, although the term would appear to refer peculiarly to brandy—the produce of the distillation of grape juice or wine. No doubt, wine was the earliest fermented liquid distilled for the purpose of separating its alcoholic portion, and this, when rendered as strong and pure as possible by the means then known, was naturally called "spirit of wine." Hence, as there is no appreciable difference between strong plain spirits, however much the substances used to furnish them may vary, all such spirit is called indifferently "spirit of wine."

a peculiar process, a marketable spirit from beet-root, before employing the latter as food for cattle. The idea entertained by the projectors of this enterprise was, that the value of the spirit when rectified would suffice to defray the cost of materials and of manufacture, while the beet-root itself would be improved as a cattle food by the operation it had undergone, and would yield a large profit to the farmer. But from the results of the experiments that have been carried out up to the present time it does not appear likely that the scheme will prove successful. The amount of produce from a given weight of the root, —not exceeding 16½ proof gallons per ton, under the best management,—is much smaller than was anticipated, and the spirit, however carefully distilled and rectified, possesses so disagreeable a taste and odour as to render it quite unfit for use as a beverage, and only available for the preparation of methylated spirit.

The manufacture of the kind of spirit derived from malt only, and sold under the denomination of "malt whiskey," or "small still whiskey" is almost wholly confined to Scotland, although there are in that country several large distilleries which produce grain and sugar spirit exclusively. "Grain spirit," or sometimes, "raw grain spirit," is the term employed to designate the spirit obtained from a mixture of malted and unmalted grain, while the term "malt spirit," is applied distinctively to the spirit manufactured from malt unmixed with grain or other materials.

In England, the few distilleries now at work produce grain or sugar spirit only, the greater part of which is disposed of to rectifiers. In Ireland, a little malt whiskey is manufactured, but the majority of the distillers supply grain spirit of fine quality for consumption as a beverage, only a small portion of it being sold to rectifiers.

Grain spirit, when it has attained a considerable age, is greatly esteemed by some persons and even preferred to malt whiskey, but when new, it is harsh and fiery. Sugar or molasses spirit, when recently distilled, is almost undrinkable, but by keeping it is said to improve and become exceedingly mild and palatable.*

The use of sugar or molasses, however, is seldom resorted to by British distillers, except when grain happens to be scarce, or when they are working to supply *methylated spirit* makers. For this purpose, it matters very little as to the quality, so long as the spirit can be obtained at a low cost. A mixture of grain and sugar, or grain and molasses, has been found to ferment better and to yield a finer spirit than sugar or molasses singly. A syrup imported from the West Indies and called "cane-juice" or

* Sugar or Molasses Spirit, as manufactured in this country, has little, if any, of the characteristic odour or flavour of Rum. This is explained by the fact, that in the fermentation of the wort from which rum is prepared, the skimmings and other impurities of the crude molasses, together with pieces of the tops of the sugar cane are purposely allowed to remain in the liquid, and these give rise to a peculiar oil or ether which distils over with the spirit, and confers upon it the aroma recognised as that of Rum.

"melado," which usually contains a considerable quantity of solid sugar, is sometimes employed with advantage in the manufacture of plain spirit. Treacle, the produce of the sugar refineries in this country, is hardly ever used by legal distillers. It is too deficient in saccharine value and too variable in composition to answer their purpose when working on the large scale for the home-market. Treacle, also, is apt to communicate an unpleasant flavour to the spirit obtained from it, which the rectifier finds it difficult and costly to remove. But the illicit distiller, especially if he carries on his operations in or near a large town, regards treacle as the material best suited to his purpose, on account of its cheapness, the facility of procuring it without exciting suspicion of his object, and the despatch with which it can be made into wort, and all traces of the proceedings effaced.

As to the nature and relative proportions of the different kinds of raw grain that are used by distillers, it will be sufficient to state, that almost any description of grain free from taint answers as a material for the production of spirits. The great object of a distiller is, of course, to obtain a supply of sugar or starch-yielding substances at the lowest possible cost, but as certain substances which would furnish starch abundantly and economically have been found to give rise in the process of fermentation or distillation to oils and ethers of a very disagreeable character, and as these, despite every precaution and artifice, contaminate the accompanying spirit to an

extent that frequently renders it unsaleable, the distiller is obliged to restrict himself, as a rule, to the use of a few well-tried and unobjectionable materials. Independently of the bad flavour of the spirit distilled from most of the substitutes for grain, great difficulty is experienced in obtaining from them the greatest quantity of sweet-wort which they are capable of yielding. For instance, in order to employ rice successfully as a source of alcohol, it is necessary to place the grain in contact with sulphuric acid and water at a very high temperature.* A small portion of the acid, when a proper heat is maintained, converts the starch of the rice, after a time, into syrup, and this when freed from the acid by the addition of lime, and fermented and distilled, affords alcohol in sufficient quantity to be highly remunerative, if only the quality of the product were unexceptionable. But no process that has hitherto been devised, has overcome the disagreeable flavour of the spirit thus obtained.

Similar objections apply to the manufacture of spirits from potatoes, beet-root, carrots, locust beans, and various other substances of the same class, all of which have been tried and abandoned as unprofitable.

Of late years foreign wheat, which is often procurable at a cheap rate, has been extensively employed by grain-distillers. When mixed with other kinds of corn it affords very satisfactory results. Barley is justly esteemed the best of all materials, and in

* This process is at present protected by a patent, so that it is not available to distillers generally.

every instance forms a large proportion of the grain-distiller's grist. Oats and rye, also, are used in considerable quantity. Indian corn, or maize, and millet have been occasionally tried with indifferent success. It appears that in mashing from these substances a peculiar treatment is required, which is not yet fully understood.

IV. Manufacture of plain British spirit.—In the preparation of this kind of spirit from the ordinary materials—malt or mixed malt and grain—five processes at least are necessary: viz., crushing or grinding, mashing or brewing, cooling, fermentation, and distillation. When cane sugar or molasses is employed in place of malt or grain, the first of these operations is, of course, dispensed with, as all that is requisite is to dissolve the sugar, &c., in hot water in order to obtain a wort fit for immediate fermentation.

Grinding and mashing.—Raw corn intended for mashing must be finely ground with millstones, so that the natural close cohesion of the grain may be effectually overcome, and a powder of sufficient fineness produced, as otherwise the mash-liquor would not gain access to every part of the meal, and thus some of its available constituents would be turned to no account. Malt, on the other hand, from its greater friability yields all its soluble matter to hot water, when it has merely been crushed or bruised between rollers. Distillers, however, generally find it advantageous to grind their malt with stones, in the same manner as unmalted grain.

Having thus prepared a quantity of "grist,"—that is, ground materials, consisting either of malt only, or malt and grain in certain proportions,—the next step on the part of the distiller is to infuse this grist in hot water for the purpose of extracting its soluble constituents. The ready-formed sugar of malt is taken up in a short time by the water, and while the "mashing" proceeds—a peculiar principle called *diastase*, which is developed in all germinated or malted grain—acts on the starchy matter alsc present in the malt, and converts this, to a great extent, into sugar. The diastase when brought through the medium of water into close contact with the particles of starch has the property of transforming them first into a gum-like substance known as "dextrine," and then into sugar. Diastase produces this effect even at low temperature, but it exerts most energy when the heat of the liquid ranges between 150° and 160° Fah.

Not only has the diastase under these conditions the power of saccharifying the starch naturally associated with it in the malt, but it can extend this influence to large quantities of starch added from other sources; one part of diastase being capable of converting two thousand parts of starch into gum and sugar.

It will thus be seen that the distiller, unless his object be the manufacture of pure malt spirit, must find it highly advantageous to work from a mixture of raw grain and malt, for by so doing he saves the cost and loss that would attend the malting

of the whole of the grist employed by him, and obtains a greater produce of spirit than he would from an equal quantity of malt, inasmuch as the best malt contains only about a hundred parts of starch to one part of diastase, which latter is competent to effect the alteration of nearly twenty times that amount of starch into sugar.*

The proper regulation of the heat of the mash liquor is very important, as if the temperature be too high it will convert the starch into gum or mucilage before the diastase has attacked it, and thus defeat the action of that agent; and if, on the other hand, the water be not hot enough, the full effect of the diastase will not be obtained and a portion of the materials will be wasted. Another evil of too high a temperature is, that it renders the pale or low-dried malt, which is generally used by distillers, apt to "set," or form a tenacious, pasty, mass with the goods which the water cannot effectively penetrate, and from which the worts cannot be easily drained.

The operation of mashing or brewing is conducted in a wooden or iron vessel, termed a "mash tun."

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* In distilleries which work from malt and grain, a mixture of materials in the following proportions is frequently employed:—

Malt—say	420	bushels at	40lbs.	the bushel.
Oats	250	,,	47lbs.	,,
Rye.....	250	,,	50lbs.	,,
Barley ...	1580	,,	53lbs.	,,
	2500			

The diastase in the 420 bushels of malt transforms into sugar the starch of the whole 2500 bushels, weighing nearly eight times as much as the malt itself. This quantity of material yields on an average, 6000 gallons of proof spirit, or between 19 and 20 gallons from 8 bushels of the grist.

On the small scale, the mixture of ground malt and water, or of ground malt, grain, and water, as the case may be, is stirred round by men with "oars." In large works this object is effected by means of steam-driven revolving rake machinery. At some distilleries there is also a small mashing apparatus placed in a close cylinder over the edge of the mash tun. The grist and the water are allowed to enter this cylinder at the same time, and being subjected to the action of the stirring machinery within, they become thoroughly incorporated as they rush into the larger vessel below. A false bottom, consisting of perforated boards or plates, is placed a little above the real bottom of the tun. Through these perforations the liquor for mashing is generally introduced into the tun, the hot water from the coppers and cold water being admitted in such proportions as will give, when mixed, a liquor of the desired temperature. The meal is then gradually added and the stirring machinery set in motion. In ordinary cases, the operation of mashing requires to be continued from an hour and a half to two hours, but if the proportion of raw grain be excessive a longer time is necessary in order that the great body of starch present may be converted as fully as possible into sugar.

When the contents of the tun have been sufficiently stirred and blended, so that the whole of the meal has been submitted to the action of the hot water, leaving no imperfectly moistened lumps or clots in any part of the mass, a fresh quantity of water at a high tem-

perature is run into the vessel, the stirring is kept up a little while longer, and then the mash is suffered to repose for a short time, so that the diastase of the malt and the "gluten"* of the grain may exert their full influence on the suspended starch before the liquor is drawn off.

As the mashing approaches completion, a striking change may be observed in the character of the liquid portion of the mixture. This instead of being turbid and insipid as at first, is become semi-transparent, bland, and sweet, most of the starch having been converted into sugar.

The saccharine solution—termed *wort* or *worts*—is now drawn off from the husks of the grain, partly through an opening in the side of the mash-tun and partly through the perforations of the false bottom; and the grains are immediately re-mashed with water of a higher temperature than at first, in order to dissolve or wash out the whole of the saccharine matter. A third mashing is also made, the produce of which is generally held over to be used as a first mash-liquor in the next brewing from fresh grain. The exhausted materials or "grains" after all the wort has been drained off are disposed of for cattle feeding, and yield a large profit to the distiller. Sugar or molasses wort leaves, of course, no available residue.

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* Gluten, so called from its glutinous or sticky nature, is a substance existing in barley-corns and all other seeds, associated with the starch, &c., and forms the most nutritious portion of the kernel. It is by a chemical alteration of some of the gluten that *diastase* is produced.

Cooling.—From the mash-tun the wort runs into a vessel placed below it, and called the "under-back" or wort receiver; in this vessel the stronger and weaker worts of the first and second mashings are mixed together, and thence conveyed as quickly as possible to what are termed the "coolers"—shallow vessels of large area, so placed that the wort contained in them shall be freely exposed to the air, and and thus become rapidly reduced to the proper temperature for fermentation. To hasten the cooling, large fans or blowers driven by steam-power are frequently used. These fans being made to rotate with great speed just above the surface of the liquor, produce artificial currents of air which favor the escape of heat, and the cooling is in many cases still further accelerated by workmen wading through the wort and pushing it about with long rakes as they advance. At most of the principal distilleries, however, the wort is now reduced to the requisite temperature by causing it to traverse a series of pipes or refrigerating vessels surrounded with cold water, or, in some places, by transmitting cold water through the pipes, &c., and filling the vessel which contains them with the worts. Both methods are nearly equal in point of efficacy, but the latter has certain advantages in practice. As the heat given up by the worts is acquired by the water, it is evident that by having the pipes so arranged that such water shall feed the boilers for subsequent brewings, fuel may be considerably economized.

It is of great importance that the wort should be

rapidly cooled, and fermentation induced to commence, because wort contains not only sugar in solution, but also part of the "gluten" obtained from the grain, or from impurities in the cane-sugar or molasses, should these materials be used. Gluten has the effect, at certain temperatures, of disposing the sugar associated with it to other changes besides that attending the production of alcohol. Accordingly, it is found in hot weather when the temperature lingers at about 90° Fah., that the wort is apt to become sour, and a gummy matter is formed which renders the liquid "ropy," a considerable portion of the sugar being transformed into two new substances, namely "mannite," a body resembling in its taste and properties the well-known manna of the druggist's shop, and "lactic acid," identical with the acid present in the whey of sour milk. Wort in which this decomposition has set in does not afterwards admit of being properly fermented, and proves a source of great loss to the distiller.

Fermentation.—As soon as the wort is brought to a temperature ranging between 65° and 75° Fah. it is removed to large vessels called "fermenting wash-backs." When fermentation has begun in wort, the liquid is technically designated "wash."

Fermentation does not occur spontaneously in solutions of pure sugar. The presence of some other vegetable substance, itself in a state of mutability or gradual decomposition is necessary to the commencement and continuance of the process. Any body in this state and capable of inducing this kind of change

is styled a "ferment." Grape-juice, and the juice of fruits generally, contains its own natural ferment, which under the requisite conditions of temperature disposes the liquid to go through that peculiar action which leads to the formation of alcohol and carbonic acid gas. But wort prepared from cane sugar or molasses does not possess a natural ferment, except in very minute quantities, although grain or malt wort does to some extent in the "gluten" of the grain. The latter description of wort will, therefore, ferment slowly; the action, however, is languid, and ceases long before the bulk of the saccharine matter is decomposed. In both sugar and grain wort distillers find it essential to successful fermentation that the process should be excited by the addition of yeast.

Yeast is the well-known substance obtained from fermenting wort at breweries; but its nature, and its mode of action upon sugar, are not well understood. Some chemists consider it to be a plant which decomposes sugar to obtain elements for its own growth. Others, with a higher degree of probability in their favour, consider it to be the gluten or adhesive matter of the grain in a state of decomposition, and which, when brought into contact with sugar, induces a similar action amongst the elements of that body; the result of the disturbance being, that those elements re-arrange themselves into the more simple forms of "alcohol" and "carbonic acid," according to another order of affinity.

When yeast is added to a solution of *pure* sugar

it excites fermentation, but exhausts itself, and is gradually deposited at the bottom of the liquid; but when added to a wort containing gluten, as that prepared from malt, grain, &c., fresh yeast is formed, and rises as froth to the surface. The comparative scarcity of gluten or other nitrogenous matter in wort prepared from ordinary raw sugar or molasses, renders it necessary to employ a much greater quantity of yeast than in the fermentation of malt or raw corn worts. In the fermentation of beer, it is not the object of the brewer to decompose the whole of the saccharine matter; the fresh yeast is therefore removed from the fermenting back, and becomes available for the distiller. In fermenting distillers' worts, on the other hand, it is desirable to effect the entire conversion of the sugar; the yeast formed is therefore left to exhaust itself in the wash. As fermentation subsides the yeast is deposited, and although in this state it has lost much of its activity, it is still capable of exciting fermentation in fresh materials. When washed with water and partially dried by pressing it in a canvas bag, it forms the well-known "German" yeast. This being of a lighter colour and free from the bitter of the hop is better adapted than brewers' barm for the making of bread.

When yeast is mixed with wort no change is immediately perceptible, but after the lapse of a few hours (the exact time depending upon the proportion of yeast) bubbles of gas are observed rising to the surface, and by degrees the whole body of the wash passes into brisk commotion from the rapid

evolution of carbonic acid gas. The temperature of the wash rises sometimes to the extent of 20° Fahrenheit, and the density rapidly diminishes from the decomposition of the sugar and the formation of alcohol. At the end of three, four, or five days the action ceases, and the wash is fit to be distilled.

In wort made from ordinary cane sugar, yeast produces another change, preliminary to those just mentioned, and converts the cane into grape or starch sugar. The effect of this change is an increased density of the wort, from the altered proportions of water and sugar present; thus 100 gallons of sugar wort at the specific gravity of 1050° will weigh 1050 lbs. avoirdupois, and, by experiment, this is known to consist of—

	lbs.
Water - - - -	920·7
Cane sugar - - -	129·3
	1050·

In becoming grape sugar, each atom or particle of cane sugar combines with one atom of water, and as the relative weights of those atoms are, sugar 171, water 9; every 171 lbs. of sugar combines with 9 lbs. of water. At that rate 129·3 lbs. of sugar in the wort supposed, would take up 6·7 lbs. of the water, and after the change the wort would consist of,—

			lbs.
Water -	920·7 less	- 6·7	= 914
Grape sugar	129·3 increased by	6·7	= 136
			1050

As the elements of water which have combined with the cane to form grape sugar now exist in a

more condensed form than before, the measure or bulk will be less; instead of 100 it will only be 99·71 gallons, but the density will have risen to nearly 1053° from the larger proportion of sugar present.

This result is not often observed when a large proportion of yeast is mixed with the wort, as the first increase of gravity is soon counteracted by the diminishing density caused by fermentation.

The yeast intended to be used in the fermentation of each brewing of wort is generally placed in the bottom of the wash-back, and a small quantity of wort from the coolers added to it. This mixture quickly enters into active fermentation, and has the effect of disposing the remainder of the wort, when conveyed into the back, to ferment more speedily than if the yeast alone were stirred into the liquid. A composition of the same kind called "bub" is sometimes prepared in a separate vessel, and transferred as it is needed to the washbacks. Unless the action of the yeast should happen to flag before the wort has properly fermented, it is not usual to add yeast or bub a second time to the contents of the wash-backs. The quantity of yeast employed by distillers working at the ordinary gravities of from 45° to 60°, seldom exceeds from 1 to 1½ per cent. of the bulk of worts set to ferment. Fresh porter yeast obtained from the large breweries is generally esteemed the best. If the yeast be stale, a greater quantity of it must be used. Much of the success of the fermenting process depends on the quality and newness of the yeast. That which the distiller's

wort itself produces and throws up to the surface as it ferments, is for the most part beaten back into the liquid so that it may stimulate and hasten the decomposition of the sugar. The portion that subsides to the bottom of the vessel when the wash ceases to ferment, although it is still capable of exciting fermentation in fresh materials, is too exhausted and feeble to bring about the rapid action and low degree of attenuation* so necessary to the economical manufacture of spirits.

The conditions of successful fermentation are,—that there should be present sugar, or some substance capable of yielding sugar, as starch, a certain quantity of water, and a ferment such as yeast. It is requisite, moreover, that a certain temperature should be maintained; the best is that ranging between 70° and 80° Fah.

If the wort be very weak fermentation will take place rapidly, and a low attenuation will be reached; but from the large proportion of water present, the formation of acetic acid (vinegar) at the expense of some of the alcohol in the liquid is greatly favoured, and the distiller loses accordingly.

If, on the other hand, the wort be at first of a very high density—very strong—it will be necessary to

* The word "attenuation" signifies literally a *thinning* or *becoming thin.* It very appropriately expresses the change which takes place in the character of the fermenting wort, as the sugar or solid matter which confers its original density on the liquid, gradually disappears under the action of the yeast, and becomes transformed into an equivalent quantity of the two much lighter substances—alcohol and carbonic acid gas. A further explanation of this change will be given a few pages in advance.

use a great deal of yeast, which is objectionable on account of its proneness to impart a disagreeable flavour to the spirit; and the large quantity of alcohol produced will have the effect of checking fermentation at an early stage, by arresting the action of the yeast. The presence of 20 per cent. of absolute alcohol is said to be sufficient to put an end to the process.

A wort which contains more than one-fourth of its own weight of sugar cannot be made to ferment. Hence the syrups used for preserving fruits and in the manufacture of liqueurs, &c., have no tendency to ferment so long as they remain in a state of proper concentration.

The period of fermentation varies from three to four or five days, according to the season, the quality and quantity of the yeast and the density of the worts. As a general rule, however, the wash reaches its utmost attenuation and is ready for the still at the end of 70 hours. At first the loss of gravity or density—which serves as a measure of the progress of fermentation—is slow and gradual, but when the wash has been for a whole day under the action of the yeast, the diminution of the density of the liquid is very rapid. As the process approaches its termination, the rate of this decrease slackens, until not more than a single degree of gravity is lost in a period of several hours. This is evidently the result of the resistance which the large body of alcohol present opposes to the continuance of fermentation. Acetic acid is now formed abundantly in the

wash, especially if the weather be warm and free access of air be permitted. The yeast falls to the bottom of the tun, and in conjunction with the gluten and other azotised matters present, promotes the conversion of the alcohol into acetic acid by absorption of oxygen from the atmosphere. If, therefore, the wash cannot be at once distilled, it is advisable to close the vessels with tight fitting covers, a practice generally adopted.

In order to regulate at pleasure the heat of the fermenting wash, so as to stimulate the process when languid or repress it when violent, "tempering pipes" are sometimes laid along the interior of the backs; a supply of hot or cold water as occasion requires is made to circulate through these pipes, and in this way the temperature of the wash is brought under the control of the operator. It is rarely the case, however, that any interference with the natural process of fermentation effects a good result, when the action is disposed to go on slowly and irregularly or to cease prematurely.

Cane-sugar and molasses wort ferments with more rapidity and reach a lower attenuation than wort obtained either from malt or mixtures of malt and grain.

It sometimes happens that what is called the "gummy" or "viscous" fermentation is set up before the proper spirituous process can be started, the cause of this is not always very obvious, but the addition of yeast to the wort while at a temperature about 100° is apt to produce it. In such cases bub-

bles of gas are observed to escape from the wash, but a froth does not form on the surface, and the gas evolved is not carbonic acid, but an explosive mixture (carbonic oxide and air); a light therefore should not be carried near to the vessel.

Attenuation.—The meaning and nature of the "attenuation" which occurs in the decomposition of a saccharine liquid under the influence of a ferment, such as yeast, may be readily explained to those who are not conversant with the subject, by the following illustration.

As a portion of the solid matter of the wort becomes resolved into carbonic acid gas and alcohol, the original density of the liquid which, of course, depends on the proportion of sugar present, must be affected both by the escape of the greater part of the gas and by the body of alcohol generated and retained in solution. The alcohol is considerably lighter bulk for bulk than water, and the gas which has disappeared represents a loss of so much of the solid matter of the wort. If all the alcohol and gas formed could be collected apart and weighed, their united weights would exactly equal the weight of the sugar decomposed, but in reality the bulk of the gas is withdrawn and the alcohol does not weigh so much as the water it displaces. There can be no difficulty, therefore, in conceiving how it is that fermenting or fermented wash has a less specific gravity than the original wort.

In the fermentation of the wort a portion of the saccharine matter originally present always remains

undecomposed at the end of the process, however successfully that may have been conducted. It is found that on an average not more than four-fifths of the solid constituents of the wort prepared from malt or grain undergo decomposition, the remainder being in most cases unfermentable, even though all the alcohol be removed and fresh yeast added. The reason of this appears to be, that during fermentation a change takes place in the character of part of the sugar present, a peculiar substance termed "extractive" being formed, which beyond the fact of its solubility in the wort has no property in common with the sugar from which it was derived, and is incapable, therefore, of yielding a further quantity of spirit.

In cane-sugar and molasses wort the attenuation generally advances so far as to leave little more than one-seventh of the saccharine undecomposed. Hence the "spent wash" or residue after distillation, from this kind of wort, is of comparatively small value for the feeding of cattle.

The value of wort for the production of spirit is estimated according to its specific gravity or density, and the quantity of spirit which should be extracted from the fermented wash by the process of distillation may be fairly calculated from the diminished gravity of the wash, or what is termed its "attenuation." The specific gravity of sugar being 1·563 it is evident that wort will be of a greater density then water according to the proportion of sugar in solution. The number denoting the specific gravity of the wort does not, however, represent the particular

weight of sugar in any given quantity, and tables have, therefore, been constructed experimentally for that purpose; of which the following is a specimen.

Density of the wort at 60° F.	Pounds weight of sugar in each gallon.
1010°	0·258
1020°	0·516
1030°	0·775
1040°	1·033
1050°	1·293
1060°	1·552
&c.	&c.

From a table such as this the quantity of wort at a particular gravity producible from a given quantity of sugar is readily calculated. Except for this purpose the table is seldom referred to: because in practice it is found more convenient to overlook the particular quantity of sugar present, and to associate at once the density of the wort with the spirit which may be obtained from it when fermented.

The relation between the degrees of gravity by which the density of wort diminishes during the fermentation, and the quantity of spirit formed, is a very simple one. In a rough or general way it may be assumed that one gallon of spirit at proof strength will be procured from every one hundred gallons of wash in respect of every five degrees of gravity which disappears, but the actual produce may fairly be expected to exceed this by 11 per cent., as there does not exist a strictly uniform relation between the amount of attenuation or decrease of density and the quantity of spirit evolved in the wash.

The "attenuation" test serves, however, as a very

useful and easily applied practical measure of the alcoholic value of wash, allowance being made for the error of its indication. As to the reason of this error, it must be evident that after fermentation has commenced the apparent density of the wash can no longer lead to a correct knowledge of the quantity of solid matter it contains, because the spirit formed being specifically lighter than water counterbalances part of the specifically heavier sugar. Thus, ordinary grain wort at the gravity 1050° will, when successfully fermented appear of the same density as water; but let the spirit be distilled from it and the original measure be made up by the addition of water and the density will now be about 1009° instead of 1000°.

The density of wort and wash in all its stages of fermentation is conveniently ascertained in practice by means of an instrument called the "Saccharometer,"* which is merely a form of the hydrometer, specially adapted to the gravities of liquids heavier than water.

Distillation.—There is no known practical means of separating spirit from the wash which contains it, except that of distillation, unless the object be merely to obtain the wash free from alcohol, when all that is necessary is to heat the liquid in an open vessel until the whole of the spirit has been evaporated or driven off by heat; but if it be desired, as is com-

* Saccharometers of every description, of the best make, such as are used by brewers, distillers, and the Revenue, may be had from the publisher of this work, at the lowest trade prices.

monly the case, to isolate and preserve the spirit, the only expedient that can be adopted is to distil the wash.

Distillation in its simplest form consists in heating the liquid to be distilled in a vessel so constructed as to prevent the escape of the vapour which is formed otherwise than by a pipe rising from the top of the vessel and afterwards bending downwards; the descending part being kept cool by cold water surrounding or flowing over it, so that the vapour as it passes along shall be condensed into a liquid before it reaches the open extremity of the pipe.

In the process of ordinary distillation advantage is taken of the difference in the degrees of *volatility*, that is, the proneness to pass off as vapour, between alcohol and water, to effect a more or less complete separation of these substances. Pure alcohol boils at 173° Fah., water at 212° Fah., while mixtures of alcohol and water boil at temperatures intermediate to these points, and bearing a certain relation to the quantities of the ingredients.

Distillers' wash is composed mainly of essential oils, acetic acid, and solid matter, in addition to alcohol and water; and as each of these constituents must influence the density of the wash, it must be evident that the boiling point of that liquid will differ to some extent from that of a liquid consisting of the same proportions of water and alcohol only. The effect produced by the fusel-oil contained in the wash, must be taken into account, although the quantity may not exceed one or two per cent. as that

substance does not boil at a lower temperature than about 270° Fah., or 58° above the boiling point of water; but the presence of small quantities of solid matter such as well-fermented wash holds in solution, is not found to modify in any important degree the boiling point of an alcoholic liquid, and the acetic acid although it has a high boiling point—243° Fah.—is rarely sufficient in amount to interfere sensibly with the boiling point of the other volatile constituents of the wash.

When wash is placed in a common still, such as has just been described, and heated to its boiling point, the vapour that first passes over is extremely rich in alcohol, a fact we should be led to expect from the volatile character of that substance. A portion of fusel-oil rises at the same time, in consequence of its affinity for alcohol, and becomes condensed in the worm, so that the first runnings of the still consist of a strong alcoholic liquid holding fusel-oil in solution. Although the boiling point of the wash is always intermediate to the different boiling points of its volatile ingredients, and depends in a measure on the quantity of each of these present, still the vapour which is given off during any part of the distilling process, does not contain alcohol, water, &c., in the same proportions in which they existed in the wash. If this were the case it is plain that no end would be obtained by the distillation beyond the separation of the solid matter from the volatile liquid combined with it, inasmuch as the vapour passing over and having a uniform composition

throughout would deposit at each instant in the receiver a mixture of all the volatile components of the wash; there would be no more alcohol, water, or oil in the distillate at one stage of the operation than at another. In reality, as the wash continues to boil, the first emission of highly alcoholic vapour is succeeded by a vapour in which the watery and oily elements predominate, and the whole of the alcohol quits the wash when about one-third of the contents of the still has been evaporated: if the process be carried on beyond this point, water, accompanied by oil, is all that will be obtained. But since the oil is of little or no value to the distiller, and the bulk of it requires to be removed by re-distillation before a wholesome or a saleable spirit can be procured, it is usual to put an end to the distillation as soon as it is found on testing the liquid issuing from the worm end, that it contains no appreciable portion of spirit.

It is hardly necessary to remark that the temperature of the boiling wash rises gradually as the alcohol passes away, until at length a temperature higher than 212° is attained, when nothing but a spiritless liquid is left in the still. The produce of the distillation of wash is called *low wines*. It is so weak, and contains so much oil, that it is necessary to re-distil it. When it is thus treated, the first runnings of the still consist, as before, of a strong spirit mixed with a portion of fusel-oil. This liquid —termed "fore-shot" or *first feints*—is collected in a separate vessel. As distillation advances the quan-

tity of oil which comes over diminishes, but towards the close of the process, the oil, now associated almost entirely with water, again shews itself and contaminates the produce, so that only the middle portions of the running are fit for consumption as spirits. Both the first and second *feints*—the former of which contains a considerable amount of strong spirit—are re-distilled with the low wines produced from the next back of wash.

In the *worm* or condensing apparatus attached to either the wash or the low-wines still, a process goes on the reverse of that which takes place in the still. The vapour as it circulates through the pipes parts with its heat to the water which surrounds them, and when sufficiently cooled in this way, condenses into a liquid. Any temperature lower than the boiling point of the wash effects a partial condensation of its vapour. But as alcohol boils at 39° below the boiling point of water, and as its vapour will not return to the liquid state until it is cooled to a temperature less than 173°, it follows that the mixed vapours from the wash become, to a certain extent, *analysed* in the worm, watery and oily vapour condensing in the parts nearest to the still, while the alcohol vapour passes onwards unchanged, and only liquifies when cooled below its own boiling point.

Since, however, the condensed vapours flow through the same worm, and unite into one liquid before reaching its extremity, it is manifest that a pure or a strong product cannot be obtained without the expense and trouble of repeated distillations, unless some device

be employed to prevent as far as possible this admixture from taking place.

Various expedients have been adopted from time to time for the purpose of keeping the alcohol vapour separate in the worm, the most efficacious of which consisted in the introduction of pipes from the first or highest rounds of the worm into the body of the still. The watery and oily vapour being chiefly condensed in these, the hottest portions of the worm, is then conveyed by the pipes in question back into the still, and there subjected to several re-distillations, while the more alcoholic vapour passes on and is condensed in a state of comparative purity lower down.

In many of the common stills, such as are used for the manufacture of potable spirit only, a contrivance of this kind is employed, but the result is seldom satisfactory. Indeed as respects whiskey intended for consumption as a beverage, it is not desirable to remove the whole of the oil, since it is upon the presence of a small portion of this substance that the flavour and peculiar character of such spirit chiefly depend.

In distillation by means of the ordinary stills there are several circumstances which make it difficult to extract a marketable spirit from the wash. Of these difficulties the principal are: 1st. The undecomposed vegetable matter of the wash, which is apt to settle upon the bottom of the still, and instead of mixing again with the liquid as it increases in temperature, to remain attached to the metal until carbonized by

heat, when it communicates a burnt or empyreumatic flavour to the spirit. 2nd. The interference of the essential oils formed during the process of fermentation and which distil over with the spirit. 3rd. The fact, already pointed out, that although the boiling point of alcohol is 39° below that of water, ebullition, which is necessary to rapid distillation, does not take place until the wash reaches an intermediate temperature depending on the proportion of spirit present, and thus water distils over in company with the spirit. As distillation proceeds, the proportion of water rising in vapour rapidly increases. When the wash contains 7 per cent. of alcohol, the distillate—that which collects as a liquid in the receiver—consists of 50 parts of water and 50 parts of spirit; but when the alcohol in the wash becomes reduced to 1 per cent., the distillate then consists of 87 parts water and 13 parts alcohol; and in practice it is found that in order to obtain the whole of the spirit out of wash which contains 6½ per cent. alcohol, or 12 per cent. of proof spirit, at least 30 per cent. of the entire bulk must be distilled over when an ordinary still is used.

To obviate the difficulty arising from the sediment of the wash adhering to the bottom of the still, steam is sometimes applied as the heating agent; but as this is not so economical as the common furnace, the latter is generally preferred, and a stirring apparatus fitted into the still to keep the bottom clear. There is also a tendency in the glutinous matter in the wash to froth up while heating, and thus add to the impurities distilled over. The presence of a small

quantity of fat or a fixed oil is found to have the effect of dissipating the froth as it arises, and hence distillers frequently add hard soap to the wash in the still: the acid in the wash decomposes the soap by combining with the soda it contains, and thus sets the fat at liberty.

Such is the general course of distillation when effected by means of a common still, such as is employed at all the smaller distilleries where the finer descriptions of malt spirits are produced, and where it is the object of the distiller, as has already been mentioned, to retain in the spirit some of the oil to give them a characteristic flavour.

Since, however, the larger portion of the spirit distilled in the United Kingdom is required in as pure a state as possible for the use of the rectifier who flavours it so as to make gin, brandy, such spirits have of late years been produced by an apparatus very different in construction from a common still.

This apparatus is generally known as "Coffey's Still," from the name of the person by whom it was first perfected, and sometimes as the "Patent Distilling Apparatus." In a few instances, an apparatus known as "Steins' Still" is employed, but it does not differ in principle from Coffey's.

The objects sought to be obtained by Coffey's apparatus are rapid distillation, and the production by one operation of a pure spirit. The obstacles to these results being obtained with the common still are, 1°, the increasing slowness of the process of

distillation as the proportion of spirit in the wash diminishes; 2°, the loss of time in emptying and recharging the still; and 3°, the absence of any means of purifying the spirit when in a state of vapour.

In Coffey's apparatus, rapidity is ensured by introducing the wash in a constant stream. In this way, only a small portion is operated upon at once, but the action is continuous, and as the wash gradually finds it way through the apparatus it is thoroughly exhausted of its spirit. The purification of the spirit vapour is provided for in another part of the apparatus.

The fact has already been noticed that when spirit is mixed with water it does not boil or rapidly vaporize until the mixture has been heated to a mean temperature, depending upon the proportions of water and spirit present, and then both water and spirit vaporize together, and also the essential oils which may be present; it must now be noticed, that if instead of immediately condensing such mixed vapour, it is allowed to diffuse itself in a chamber maintained at a temperature a few degrees above the boiling point of alcohol (173° Farenheit), nearly the whole of the water and oils will resume the liquid form, carrying with them but a small portion of the spirit, and the spirit vapour may then be drawn into another chamber at a lower temperature, where it will be condensed, and spirit will thus be obtained in a state of very great purity. Upon this principle the process of rectification is conducted in Coffey's apparatus, but a detailed description of its construction and mode of action would be unsuited to the present work.

From the difficulty of effecting a complete separation of alcohol from water, the purest and strongest spirit obtained after repeated distillations by a common still contains about 7½ per cent. of water, and is of the density of ·825 at 60° Fah. or 62·5 per cent. over proof, and at this strength it can only be produced in small quantities at each operation. By means of Coffey's apparatus, however, spirit at a uniform strength ranging from 65 to 67 per cent. over proof is produced continuously. Even at the latter high strength the spirit is a mixture of alcohol with 4·5 per cent. of water, and it seems doubtful whether this proportion of water can be materially lessened by any further improvement in the art of ordinary distillation.

Spirit at the high strength yielded by Coffey's apparatus is not of much commercial importance, but as it contains a large amount of alcohol in a small bulk, distillers avail themselves of that circumstance to economize the charge for carriage when the spirit has to be sent any considerable distance. With the exception, however, of the small quantity required for uses in the arts and for combustion in lamps, it is usually reduced in strength to a considerable extent before it is disposed of, the ordinary selling strength being 25 per cent. over proof. In fact a high strength is aimed at by distillers, chiefly with the view of obtaining the spirit free from oily impurities.

VI. Fusel Oil.—It will have been seen that this is a very troublesome bye-product to the distiller in the course of his operations. It is formed along with

the alcohol during the fermentation of the wort, under circumstances which are not fully understood, neither has the quantity produced in proportion to the spirit been ascertained; but it may be stated as a rough approximation that at four of the large distilleries in and around London, the quantity of fusel oil separated from the feints in six months, in the year 1856, was 12,366 gallons, the spirit distilled being 2,685,682 proof gallons, and the oil averaging 0·46 per cent. of the spirit: but the proportion does not appear to be by any means uniform.

Fusel oil has a great attraction or affinity for alcohol, and is freely soluble in that substance. Upon the addition of a large amount of water this affinity is overcome: the oil then separates from the spirit and collects on the surface of the liquid. It also separates to a considerable extent from weak feints, which have been allowed to stand undisturbed for a time.

This oil, so called—for it has in reality but few of the properties of ordinary oil—is made serviceable in some distilleries as a source of light and as a lubricant for machinery, but its odour is extremely disagreeable and oppressive. It is also employed by confectioners, after having undergone certain chemical changes, in preparing imitation of *pine-apple*, *jargonelle* pear, and other fruit flavourings, and as a solvent for resins.

Fusel oil, it should be understood, does not saponify—form a soap—like most other oils, when mixed with an alkali, (potash or soda).

Comparative yield of Materials.—It may be stated that on the average

1 quarter of malt will produce	from	18 to 19	proof gallons of spirits.
1 quarter of malt and grain	,,	19 to 20	,,
1 cwt. of ordinary cane sugar	,,	11·5	,,
1 cwt. of good molasses	,,	8	,,
1 cwt. of treacle	,,	6·7	,,
1 cwt. of rice	,,	7½	,,

It appears accordingly that if a quarter of malt yield 18 proof gallons of spirits, it will require 252 lbs. of molasses and 175 lbs. sugar to give the same produce.

CHAPTER II.

RECTIFICATION AND COMPOUNDING OF SPIRITS. MANUFACTURE OF GIN, BRITISH BRANDY, CORDIALS, ETC.

I. General processes of rectifying and compounding.—Plain spirit as produced on the great scale by Coffey's still, or other form of distilling apparatus, although usually of a high strength and of comparative purity, is still contaminated with small portions of essential oil and ethers. The more effectual separation of these substances, together with the manufacture of the purified spirit into gin, brandy, compounds, &c., constitutes the special business of the rectifier or rectifying distiller.

Raw spirit may be greatly improved in quality by simply mixing it with a large volume of water and re-distilling it at a low heat, but its purification is further assisted by the use of the crude alkali potash, known in the trade as "grey salts," with the occasional addition of a small quantity of pearlash (carbonate of potash), technically termed "white salts." These agents have the property not only of cleansing the spirit, but also of strengthening it by their affinity for the water present. The quantity generally employed is about 1 lb. of grey salts

to every 100 gallons of the spirit. The alkali should first be dissolved in as little water as will effect its solution, and the liquid then rendered clear by filtration. It is a common practice, however, to place the crude alkali, without any preparation, in the still.

As soon as the potash is added distillation is commenced, the first and last portions of the distillate being run, as in the original manufacture of the spirit, into a vessel called the "feints back," and the purer product into separate vessels, according to the strength at which it comes over. The same spirit is frequently subjected to a second and even a third rectification, with, in each case, about half the first quantity of alkali. The feints, or first and last runnings of each operation, are allowed to accumulate until a considerable quantity has been collected, when the whole is distilled, and as much pure spirit as possible separated from them by the usual processes. Having obtained a supply of purified spirit, the rectifier proceeds to convert portions of it into gin, British brandy, and the various spirituous compounds and cordials common in the trade. In the manufacture of gin, spirit of the first or second rectification is run into a still in which have previously been placed various berries, seeds, roots, or other flavouring matters, and the whole submitted to distillation. By some rectifiers juniper berries are used alone, but, while this is always the preponderating ingredient, a number of other substances is, in most cases, employed as well. These consist chiefly

of coriander seeds, carraway seeds, aniseeds, and cardamoms, the roots of calamus aromaticus, angelica, orris, and liquorice, together with orange peel, lemon peel, crushed almond cake, and cassia buds. There is seldom any difference in the nature of the flavouring materials, but the proportions vary at almost every rectifying house. A very slight reduction or increase in the quantity of any one of the substances used will sensibly affect the flavour of the gin, and provoke the criticism of consumers.* The first and last runnings of the flavoured spirit, being very impure, are conveyed into a feints-back, and the intermediate runnings, according to their strength, into separate vessels. Water is now added to the gin to reduce it to the usual selling strengths, and if on dilution a turbidity occurs from the precipitation of some of the flavouring oils, the spirit is "fined" by mixing with it solution of alum or isinglass.

In some few cases the rectifier does not employ a still, but prepares his gin by simply dissolving the

* So far is this nicety of taste carried on the part of the public, that it is a frequent thing to hear it remarked, that "the gin sold by so and so is rank poison," although in reality there may be no better reason for so strong an assertion then the fact that the gin in question differs a little in point of flavour from that which the speaker is accustomed to drink. The palate of a regular gin-drinker becomes at last quite intolerant of any variety of that liquor, however good and pure, but the particular "Old Tom," or "Cream of the Valley" which he habitually consumes. Hence the common but generally groundless charge of adulteration against the rectifier, dealer, or retailer. With very few exceptions, the only improper addition ever made to gin, in the hands of the preparers or vendors, consists of a too liberal dose of water, for the sake of increasing the profits.

essential oil of juniper, aniseed, &c., in the strong spirit procured by him from the distiller, and afterwards reducing the mixture to the customary strength with water. But it seldom happens that the raw spirit which the distiller supplies is sufficiently pure for the purposes of the rectifier, and the latter is obliged, in consequence, to remove the objectionable taste, odour, or harshness of such spirit, by re-distillation, before he can safely communicate to it the peculiar flavouring matters of gin or British brandy. It is also found preferable, for certain reasons, by many rectifiers, to buy plain spirit of a low, rather than a high strength, from distillers, and to subject it to re-distillation in their own stills. They consider that they obtain, in this manner, a spirit better adapted for gin-making than any with which the distiller can furnish them, however strong and free from impurities, and that the expense of re-distillation, otherwise unnecessary, is fully indemnified by the superior quality of their gin. The kind of gin prepared by the mere admixture of essential oils with spirit, instead of the process of distilling the berries, roots, and seeds themselves, in conjunction with the spirit, is not generally liked by consumers. It is thought to be deficient in mildness and delicacy of flavour, but as it can be sold at a cheaper rate than the distilled spirit, it is of course, largely bought by persons with whom price is the chief consideration.

The spirit used in making gin by this process of compounding is, in some cases, rendered a little purer or more neutral than when it comes from the dis-

tillery, by simply causing it to filter slowly through layers of fresh charcoal.

British brandy of the ordinary kind is manufactured by adding to plain spirit, French wine-vinegar, alcoholic extract of prunes, burnt sugar for colouring, and a little foreign brandy. Sometimes the liquid procured by distilling spirit with the *marc* or refuse of the grape press, mixed with *argol* or crude wine-stone, is added to plain spirit, and the colour and flavour brought up by the addition of fruit tincture and caramel. The process of compounding is all that is resorted to, as a general rule, in the fabrication of British brandy. Certain rectifiers possess the art of imitating the best French brandy much more successfully than others in the trade. The use of a little *œnanthic ether* obtained from wine greatly increases the resemblance to the foreign spirit. In some cases "British brandy" so-called, consists of little else than diluted spirits of wine coloured with burnt sugar.

Compounds is a rather vague term, but the liquors known by that name consist, in general, of plain spirit to which have been added the juice of fruit, sugar, and various flavouring materials. The appellations given to the different spirituous mixtures are nearly as numerous and indefinite as the methods of preparing them. It may, however, be stated, that a clear, thick syrup of white sugar, mixed with from 20 to 30 per cent. of proof spirit forms the basis of all such liquors. Essential oils, vegetable acids, or sometimes a little fruit tincture, blended with this

will produce the various cordials or liqueurs known as "cloves," "peppermint," "aniseed," "lovage," &c. No portion of the spirit present is ever generated by fermentation of the saccharine ingredients, as in the case of genuine "sweets," or "made wines."

(2.) *Distillers and Rectifiers.*—The legal distinction between the trade of the "distiller" and that of the "rectifier or compounder," is not generally well understood by the public, some confusion existing as to the exact nature and limits of the business carried on by each of these manufacturers.

Any person using a still is, of course, a *distiller;* but the law applies that term exclusively to the producer of *raw* spirit or whiskey, and bestows the name of "rectifier or compounder" on the person who receives raw spirit from the distiller and again distils it along with various flavouring substances, or who simply compounds it in the manner just described, so as to convert it into the liquors known as gin, British brandy, &c. The law requires that the trades of the distiller and rectifier or compounder, shall be conducted on wholly distinct and separate premises not less than a certain distance apart. This regulation is designed to protect the Revenue against the frauds that might be committed, if a distiller had the opportunity of conveying spirit which had evaded a charge of duty at his distillery to rectifying premises owned by him either at the same place or very near at hand, where he could dispose of it, without much chance of detection, as part of his legitimate stock.

(3.) *Recipes for compounds, liqueurs, &c.*—It is properly and exclusively the business of the licensed rectifier or compounder to prepare these liquors, and to dispose of them either directly to private consumers, or to the spirit dealer or retailer for sale to the public. The law accordingly prohibits retailers who have not taken out a compounder's licence from engaging in the manufacture of such spirituous mixtures as are technically considered, *compounds*, *British brandy*, &c.

But by the regulations of the Board of Inland Revenue, a dealer or retailer is not to be interfered with in mixing sugar, the juice of fruits, or essential oils with plain British spirits, or with foreign spirits. Various cordials and other sweetened or flavouring liquors, as, for instance, currant, raspberry, or cherry brandy, &c., may therefore be made legitimately by persons holding only a wholesale or retail spirit licence, but the spirits must not be called or vended as, "British Brandy," "British Geneva," &c., these terms being used expressly to denote compounds.

A dealer or retailer is also allowed to make rum-shrub, and may have in stock, juice of fruit to which has been added spirits not exceeding the proportion of 5 per cent of the juice.

As a general rule, cordials and all liquors of a similar kind are troublesome to prepare, and can hardly be made with advantage on the small scale unless by those who have a special knowledge of the art. The wholesale manufacturer obtains his supply of sugar, essential oils, and other flavouring substances in large quantities and in the best market.

He is thus enabled to produce a good article at a less cost than the retailer would incur, and also with less risk of failure.

Since, however, it may be convenient at times for those who are not regular compounders to know how to make up small quantities of the different cordials, &c., in most frequent demand, a few plain and well approved recipes are here subjoined.

It should first be observed, that the customary strength of sweetened compounds in general, ranges from about 64 to 80 per cent. under proof, that is, the mixtures are so prepared as to contain from 36 to 20 parts in the hundred of proof spirit. This is found to be the best and most palatable proportion.

Refined sugar must be used in all cases, to avoid the objectionable colour and flavour that would otherwise be imparted.

Instead of sweetening with solid sugar, a syrup called "capillaire" is sometimes employed. It may be formed of a convenient strength, as follows :—

CAPILLAIRE.

For 10 gallons, take 80 lbs. best loaf sugar, broken small. Cover with 5 gallons and 1 quart of liquor.* Heat until it boils, stirring all the time. When boiling add one ounce of pyroligneous acid (strong acetic acid sold by chemists). Continue the boiling and stirring for twenty minutes. Skim if necessary, and when cold, rack off from the dregs.

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* Liquor is the technical name for water when used in any of the processes of brewing, distilling and compounding.

Each gallon of this syrup will contain 8 lbs. of sugar.

SWEETENED GIN.

The taste of each locality or class of consumers must, of course, govern the amount of sweetening matter to be added to gin; but in ordinary cases, the following proportions will give a palatable article.

If the spirit be 17 per cent. U.P. (full strength), to every hundred galls. add 33 lbs. sugar.

If the spirit be 22 per cent. U.P. (usual strength), to every 100 galls. add 31 lbs. sugar.

[*The meaning of the letters "U.P." and "O.P." as denoting spirituous strength will be explained in the chapter on the Hydrometer.*]

In sweetening gin or other spirit, it is necessary to dissolve the sugar separately in water, using only as much as will be sufficient for the purpose. Sugar dissolves very slowly and imperfectly in spirits, particularly if the strength be high. For this reason, it is better to employ capillaire, as under—

To every 100 gallons of gin at 17 U.P. add 4 galls. 1 pint Capillaire
" 22 U.P. add 3 galls. 7 pints ditto.

PEPPERMINT.

This universally popular cordial should be prepared with the best English oil of lavender, and clean neutral spirit. The foreign oil is much cheaper, but it communicates a bad flavour and should never be resorted to for motives of economy.

For 10 gallons, take—

1 ounce English oil of peppermint
3 gallons of rectified spirit at 43 per cent. O.P
30 lbs of refined sugar, dissolved in
5 galls. 1 pint liquor.

Rub the oil in a mortar with a few drops of acetic acid, mix with spirit, add the syrup, and fine with two quarts of isinglass finings.

Strength—60 per cent. U.P.

N.B. A little oil of cinnamon or cassia is said to improve the flavour.

CLOVES.

Made in the same manner and with the same proportion of ingredients as peppermint, (see above), only substituting oil of cloves for oil of peppermint. This cordial is usually coloured with a little burnt sugar (caramel), or if wanted of a pink colour, with archil.

CINNAMON,

CARRAWAY,

ANISEED.

For any of these, use the appropriate oil with water and syrup in the proportions above given as respects peppermint. Colour according to taste.

Strength—about 60 U.P.

RASPBERRY.

For 10 gallons—

5 gallons fresh raspberry juice
2 gallons rectified spirit, 43 per cent. O.P.
30 lbs. refined sugar
1 gallon 1 pint liquor
½ dram oil of cassia
½ dram Vanilla root.

First steep the Vanilla root, cut fine, in a wine glassful of strong spirit for two or three days. Then add the Vanilla extract and the oil of cassia (rubbed in a little acetic acid) to the specified quantity of spirit, and stir well together. Dissolve the sugar in the

raspberry juice and liquor, add the spirit to the syrup thus produced, blend the whole thoroughly, and when at rest fine with a quarter of a pint of isinglass finings.

In some receipts it is recommended to use colouring, but this addition seems unnecessary when the natural tint of the fruit is good.

Raspberry of inferior quality, but still a very passable article, may be compounded as follows:—

For 10 gallons—

3 gallons 2 quarts raspberry juice
1 gallon 2 quarts plain spirit, 43 per cent. O.P.
4 gallons 5½ pints liquor
11¼ lbs. loaf sugar
11¼ lbs. raw sugar
½ dram oil of cloves
½ dram oil of cassia
1 pint best colouring.

First rub the oils with a little acetic acid, then blend with the spirit, to which add the juice. Dissolve the sugars in the liquor, stir in the colouring, mix all together and fine with isinglass.

Strength of both qualities about 80 per cent. U.P.

LOVAGE.

For 10 gallons—

5 ounces of lovage root, cut small, and steeped for a fortnight in strong spirit
1½ drams oil of nutmeg
1½ drams oil of cassia
½ dram oil of carraway
3 gallons rectified spirit, 43 per cent. O.P.
28 lbs. refined sugar dissolved in
5½ gallons liquor
1 pint of colouring.

Rub the oils with a little acetic acid and add to the

spirit: then add the extract from the root, and lastly the syrup and colouring. Blend well together, and fine if necessary with isinglass.

Strength—about 60 U.P.

CHERRY BRANDY.

This favourite cordial should be prepared from the freshly gathered fruit, which after being steeped in strong spirit yields a tincture that must then be brought to a proper strength and sweetened. There are many receipts in vogue, but the following will perhaps be found the simplest and most useful of any.

Take any quantity of small black cherries, pull off the stalks and slightly bruise the fruit in a tub with a mallet or wooden hammer: transfer to a cask and cover over with strong spirit, stirring up the whole occasionally, particularly for the first few days. The cask should be placed on its head and a tap inserted before the crushed fruit is put in, a small basket being fastened inside over the tap-hole to prevent the fruit from clogging up the tap. This process will yield a very black, strong, liquor. As the cordial is wanted for use, draw off a gallon at a time, and add to it a gallon of water and 2 lbs. of sugar.

As often as any of the spirituous juice is drawn off an equal quantity of strong spirit should be poured in at the top, until the produce begins to show a weakness of colour or flavour, when fresh fruit must be added.

In some houses it is customary to mix cherry

brandy with elderberry wine and sell the whole under the name of the former. To prepare the elder wine, elderberries must be steeped in spirit and the infusion treated in the same manner as the cherries. In making up the wine, cider may be substituted for a portion of the water with advantage. A few drops of sweet spirit of nitre improve the flavour. Equal quantities of the cherry brandy and the elder wine may be mixed together.

If the cordial be required with the whole cherries preserved in it, as is usually the case at the shops of confectioners, &c., a different process must be adopted. To make one gallon, take 12 lbs. of morello cherries, and cut off the stalks so as to leave about half an inch of each on the fruit. Prick each cherry with a needle, put the fruit into bottles and cover it with brandy: cork close and stop for a month: then pour off the spirit, and to every quart add eight ounces of sugar-candy powdered. When dissolved, pour the brandy back upon the cherries.

GINGER BRANDY OR CORDIAL.

For 10 gallons, take—

2 lbs. Jamaica ginger
3 gallons rectified spirit, 43 per cent. O.P.
30 lbs. refined sugar
½ ounce citric (or Tartaric) acid
1 wine glassful Vanilla extract
½ pint colouring.

Bruise the ginger coarsely; steep in some of the spirit several days and strain off. Prepare the

Vanilla extract, as directed under raspberry, (page 61). Well wash the ginger with water to get out the whole of the spirit: mix all the ingredients together and add liquor sufficient to make up the quantity to ten gallons. Fine with isinglass, if desirable.

Strength—about 60 U.P.

A commoner kind of ginger cordial or *gingerade* may be had by simply adding essence of ginger to plain spirit or British brandy, and sweetening with syrup. To make essence of ginger economically, steep 12 lbs. Jamaica ginger for a fortnight in 2½ gallons of strong spirits, then press and strain off. The best way of preparing the cordial as it is wanted for use is to add the essence, little by little, to any given quantity of syrup, until an agreeable, not too hot, compound is formed, and then if the liquor be too thick, dilute with water.

RUM SHRUB.

For 10 gallons, take—

1 gallon Seville orange juice
½ gallon lemon juice
3 gallons rum, (common quality) at proof.
11 lbs. refined sugar
14 lbs. raw sugar
4 gallons liquor.

Dissolve the sugars in the liquor: blend all the ingredients together, and clarify with a pint of isinglass finings. Strength—70 U.P.

ORANGE BITTERS.

For 4 gallons, take—

2 ounces cardamom seeds
8 „ gentian root
8 „ dried orange peel.

Steep in two gallons of spirits of wine (43 O.P.) for a fortnight, then add half a gallon of capillaire or 4 lbs. loaf sugar, and half a gallon of water.

BITTERS, *(various.)*

(1.) Steep 1 lb. gentian root, 8 ounces dried orange peel, 1 lb. grains of paradise, in 1½ gallons spirits of wine. After fourteen days, strain, add half a gallon of raisin wine, and colour with two drams of cochineal.

(2.) Bruise 2 ounces of coriander seeds and 8 ounces of Virginia snake root: steep for five days in a gallon of plain gin (22 U.P.) Shake up occasionally, then strain off. Put into a bottle half a pint of strong spirit of wine, 1 ounce of orange peel, and ¼ ounce oil of carraway. Shake the oils and spirit together until well mixed. Stir in with the rest, adding 16 lbs. loaf sugar and 6 gallons of common gin. Mix altogether, and fine with a little alum, dissolved in water. Colour with burnt sugar.

(3.) 2 gallons rectified spirit, 2 drams oil of Seville orange, 1 dram oil of carraway, 1 dram oil of wormwood, ¼ ounce almond cake, ½ ounce coriander seeds, 4 lbs. loaf sugar, 1 gallon water, steep together, and blend the oils as above directed.

NOYEAU.

For 5 gallons, take—

2½ drams oil of Bitter almonds
¼ dram oil of cassia
¼ dram oil of mace
¼ dram Vanilla root (steeped in a little spirit of wine)
1½ gallons rectified spirit, 43 O.P.
15 lbs. loaf sugar
2½ gallons liquor.

Mix the essential oils with a little acetic acid before adding them to the spirit: stir in the Vanilla extract and the syrup made by dissolving the sugar in the liquor. Blend well together, and clarify with isinglass finings.

N.B. It is useful to know that 16 lbs. of dry refined sugar occupy the space of one gallon.

CHAPTER III

FOREIGN AND COLONIAL SPIRITS.

HOLLAND OR GENEVA: RUM: BRANDY.

(1.) *Manufacture of Hollands.*—There is little doubt that the liquor called in England, gin, derives its name from the word Geneva, and that the British spirit is essentially an imitation of its foreign prototype. The importation of spirit from Holland, at one time much more considerable than at present, naturally led to the adoption of the term, Hollands, or Hollands-gin as a substitute and equivalent for Geneva. It should be understood that there is no difference whatever between the spirits respectively so designated.

On its first introduction Geneva was sold and used merely as a medicine; but the fame of its beneficial effects and its agreeable flavour soon led to the establishment of large distilleries where the spirit was prepared for general use as a beverage. From the first, the Dutch people exhibited a special skill in the manufacture of this kind of alcoholic liquor. It is their national spirit, and indeed the one almost ex-

clusively drunk by them, and it is from Holland that the entire supply of Geneva is now procured by other countries.

When, in the year 1860, the duty on foreign spirits was lowered from 15s. to 10s. 5d. per proof gallon, it was generally anticipated that the consumption of Hollands in this country would increase to so great a degree as seriously to affect the English gin trade. For some short time following the reduction of duty, the Dutch distillers found it difficult to meet the suddenly augmented demand for spirit of their manufacture; but the briskness of the importation soon languished, and Hollands became and now remains as little in request among English people, as when it was subject to the higher duty. It would appear as though Hollands, despite of its undeniable fine flavour and other good qualities, does not possess sufficient *body* or fulness, to render it generally acceptable to the tastes of people who are accustomed to whiskey and gin of British manufacture. But for dietetic purposes, under medical advice and sanction, Hollands is more frequently prescribed than any other spirit, except brandy.

In preparing Hollands or Geneva the following process is usually adopted by the Dutch distillers.

They first take, say, two quarters of malt, ground very finely, and three quarters of rye meal, or ten quarters of rye and three quarters of malt meal, but always mixtures of these two grists. The rye meal is mashed with the least quantity of *cold* water it is possible to employ for the purpose, and when uni-

formly incorporated, as much water at 212° or boiling point is added as will form the mass into a thin batter. It is then put into one, two, or more gyle tuns, with much less yeast than the English distillers employ in the fabrication of whiskey. Ordinarily, on the third day, the Dutch add the malt meal, prepared in a similar manner, but not before it comes to the temperature of the fermenting wash, at the same time putting in as much yeast as at first. The great secret lies in mixing the grist with cold water, and in afterwards using the right proportion of boiling water so that the mash may remain sufficiently diluted after the introduction of the fine meal, and also in well rousing the back, so that the wash may be thin enough for distilling without danger of its burning on the bottom of the still. It is usual to convey both the grains and the wash into the still. A great deal of the saccharine matter of the wort is suffered to remain undecomposed by fermentation, with the view, it is supposed, of improving the quality of the spirit, for it is an established fact that when some considerable portion of extract is left unattenuated in wash, a much finer and softer spirit is procurable then it is possible to obtain by any management from thoroughly attenuated worts. The produce is esteemed to have such superiority in point of flavour, as to fully compensate the distiller for the loss he sustains from the imperfect fermentation.

It is no doubt the employment of the large quantities of yeast necessary to the ensuring of a low attenuation, which chiefly contaminates the spirit of British

distillers by imparting to it traces of the peculiarly disagreeable taste and odour of the ferment.

The low-wines or product of the first distillation, is re-distilled and afterwards rectified. In the process of rectification a few juniper berries and occasionally a few hops are added, to impart to the spirit a terebinthine flavour.

A simple method of making a spirit of similar flavour to Geneva, is to take, say, three pounds of juniper berries and two ounces of oil of juniper for every twenty gallons of proof spirit, and to distil slowly until feints begin to come over. Another kind may be prepared with a less quantity of juniper berries and Strasbourg turpentine, omitting the oil of juniper.

Strasbourg turpentine is of a light yellowish-brown, fragrant, and the least acrid of the turpentines.

The stills used by the Dutch are mostly those of common construction. An improved apparatus on the principle of Coffey's patent adverted to in the 1st chapter, is in operation at some of the distilleries, but the makers of the best Geneva prefer to employ the old fashioned stills.

At Maidstone in Kent a rectifying house engaged many years ago in the preparation of Hollands, and for a time the business prospered. Difficulties, however, were thrown in the way by the Excise laws, and the original proprietors became bankrupt. At the present time an article very closely allied in quality and flavour to genuine *Schiedam* or Geneva is made by a rectifier in the same town.

Hollands is usually imported in bottles of a peculiar shape and at a strength somewhat lower than that of English gin.

(2.) *Manufacture of Rum.*—The derivation of the word rum is an unsettled point. Many suppose that it receives it name from the last syllable of the Latin word *saccharum*, signifying sugar. Others contend that, as of all distilled spirits rum has the strongest odour, the word, *aroma*, may have led to the abbreviation—rum. But this seems merely conjectural, and the point is of no importance.

Rum is a spirit obtained by distillation of the fermented juice of the sugar-cane, and owes its peculiar smell or taste, as observed in Chapter I., to the practice of allowing the lees or scum of the crude syrup and pieces of the tops of the cane to remain in the liquid during fermention. Volatile oils and acids are, no doubt, thus engendered, which combining with the spirituous vapour that rises on the wash being heated in the still, communicate a very marked flavour to the product of the distillation. The plain spirit prepared in this country from imported cane-sugar or molasses, which is free from the coarse impurities above mentioned, possesses little if any of the characteristic aroma or taste of rum.

Molasses is the dark, viscid, uncrystallizable syrup remaining in the process of sugar making, after the solid sugar has crystallized out. It derives its dark colour and its slightly bitter flavour from the partial charring or burning that takes place in the evaporation of the cane-juice over a common fire. The

modern improvement of evaporating the syrup in *vacuum pans*, and thus accomplishing the desired object at a much lower temperature than would otherwise be necessary, has led to a great reduction in the quantity of molasses formed, and has been productive of a corresponding advantage to the planter.

It is from molasses almost wholly that rum is manufactured. The principal countries in which it is produced are the East and West Indies. The island of Jamaica yields the finest quality. Wherever the sugar-cane is cultivated rum is distilled. It is not exactly known at what period the fabrication of this spirit first commenced, but the earliest plantation of sugar-canes was established in Hispaniola or St. Domingo, by the Spaniards in 1520. Such was the rapid increase of the culture, that in 35 years afterwards there were not less than thirty plantations on the island, and it is stated that in 1544, thirty-four sugar mills were established. As the use of the still was then known, it is probable that not long subsequent to this period, the manufacture of rum suggested itself as the only means by which the planter might indemnify himself for the losses incurred in disposing of the skimmings from the sugar pans, and the molasses when separated from the sugar.

In Edwards's History of the West Indies it is stated, that a sugar plantation which produces 200 hogsheads of sugar, of about 16 cwt. each, requires for the manufacture of rum, two stills, one of 1000 gallons content for the wash, and one of 600 gallons

for the low wines, with suitable worms and refrigerators. Two cisterns are also necessary, one of which must have the capacity of about 3000 gallons to hold the *dunder*, a name which signifies the *lees* of previous distillations. This substance serves all the purposes of yeast in the fermentation, and its attenuating properties are such, that the materials with which it is mixed are said to yield a much greater proportion of spirit than could be obtained if they were fermented without it.

The other cistern is required for the skimmings, &c., from the sugar house, and twelve, or more, fermenting tuns also are necessary. Dr. Ure says, "lees that have been used more than three or four times are not considered to be equally fit for exciting fermentation when mixed with the sweets, as fresher lees." The wort is made in Jamaica by adding to 1000 gallons of dunder, 120 gallons of molasses, 720 gallons of skimmings (the latter being equal to 120 gallons of molasses in sweetness), and 160 gallons of water, so that there may be in the liquid nearly 12 per cent. of solid saccharine. Another proportion often used is 100 gallons of molasses, 200 gallons of dunder, 300 gallons of skimmings and 400 gallons of water, the mixture containing therefore 15 per cent. of sweets. Dr. Ure considers that so much dunder or spirit wash would be apt to communicate an unpleasant flavour to the spirits.

The objectionable flavour designated as *still-burnt*, so often met with in rums, is no doubt owing to the use of too large a proportion of dunder.

Fermentation is conducted in much the same manner as in the manufacture of British spirits. From nine days to a fortnight is required to effect a thorough attenuation, the time depending on the original density of the wort, the quality of the materials, and to a great extent on the state of the weather. As the molasses wash is apt to acetify very quickly, especial care should be taken to cover up the wash backs as soon as possible to exclude the air. It is necessary also that all the vessels and utensils should be well scalded after each time of use, quicklime being mixed with the water.

The produce of the first distillation, or low wines, is when re-distilled called high wines, or strong rum, and is of various strengths, according to the number of gallons run off. In proportion to the strength required the distillation is repeated, the first runnings necessarily possessing the highest strength.

About 115 gallons of proof rum are usually obtained from 1200 gallons of wash. The proportion which the rum produced bears to the sugar, in very rich moist plantations, is rated, according to Edwards, at 82 gallons of rum to 16 cwt. of sugar; but the more general ratio is 200 gallons of rum to three hogsheads of sugar; this proportion, however, will necessarily vary with the value of rum and molasses in the market, since whichever fetches the most remunerating price will be brought forward in the greatest quantity. On one considerable estate in the island of Grenada, 92 gallons of rum were made for every hogshead (16 cwt.) of sugar.

Edwards says the best rum is made from molasses. The proportion of molasses made in crystalizing a cwt. of sugar varies from 50 to 90 gallons, and depends both upon the climate and the season, being lowest in the Leeward Islands, which have a dry climate, and highest in Demerara and Trinidad, and it is in the latter that, in fine seasons, the proportion reaches 90 gallons per cwt. Nearly one gallon of proof rum may be made from one gallon of molasses. The value of the raw material for a gallon of rum has been as high as 1s. 10d. in the West Indies; the cost of distillation, it is alleged, averages about 8½d. per gallon, and for an additional 8½d., for freight and other charges, the spirit may be brought into the English market. These calculations, however, are probably in excess of the truth, rums are now imported into England considerably stronger than formerly, and this concentration in bulk occasions a proportionate reduction of freight and charges. Besides, the improvement in the facility of manufacture must have an important influence on the price.

From the present low state of the market price the distiller of rum has no profit, but being the grower of the material, and having his capital embarked in the trade, he is compelled to manufacture it from necessity, and the sooner he can turn the article to account the better he is enabled to bear any loss and meet his engagements.*

Demerara and Essequibo rums have long been highly esteemed in America, and have of late found

* British and Foreign Spirits, by Charles Tovey.

much favour in the English market, the quality being considered as almost equal to that of Jamaica. In Brazil, rum is manufactured on a large scale, the produce being exported to America and Europe. The process adopted in Brazil is, for the most part, extremely rude and simple, but the recent introduction of copper stills into the country has led to improvements in the mode of distillation and to a great increase of quantity.

Age has a more than usually marked effect on the character of rum as a beverage, rendering the spirit soft and mellow, and enhancing its commercial value. By some persons the liquor called "pine-apple rum," is supposed to be the produce of the fermentation and distillation of the juice of the pine-apple, but this is altogether an erroneous impression. No doubt the idea took rise in the practice of some of the planters many years since, who used to mix pine-apple juice with rum, so as to impart to it the characteristics which are properly the result of age. The delicious acid and sweet matter of the fruit would give probably a very agreeable taste and odour to the spirit, but with the low prices at present obtainable for rum, any admixture of the kind could not be profitably practised.

The average strength of rum as imported, is about 20 per cent over proof. Its colour is artificial, being derived either from the addition of burnt sugar or from an absorption of a dark colouring matter from the wood of the cask. Like all other spirits, it is white as it comes from the still.

(3.) *Manufacture of Foreign Brandy.*—The name *brandy* is by common consent derived from the German words signifying *burnt wine (brand wein)*. It is easy to conceive that the expression, "burnt," means no more than, subjected to the action of fire or distilled by means of a strong heat. The fermented juice of the grape is that which alone furnishes brandy properly so called, but a great variety of alcoholic liquids obtained from other sources than the grape passes under this designation, no doubt because ardent spirit was first procured from wine, and such spirit has come naturally to be regarded as the type of spirits in general.

In a work like the present it would be useless to enter into a description of the numerous forms of spirituous beverages, each entitled *a brandy* although neither procured wholly from the grape nor perhaps containing the least portion of true vinous alcohol. All that need here be introduced is a short account of the mode of making genuine foreign brandy such as finds its way into this country. It should be observed, however, that a good deal of what arrives at our ports under the pretence of being *bonâ fide* grape spirit is nothing more than plain corn or potatoe spirit, often of very poor quality, and coloured and flavoured so as to resemble in the more obvious respects the article whose name it thus fraudulently assumes. Abroad, this coarse and common spirit distilled from potatoes, corn, and saccharine fruits, the grape excepted, is largely used in the fortifying of wine intended for the English market, and is

the chief cause of the feverish sensations and the head-ache of which so many complain after drinking ordinary sherry or port. Potatoe spirit, unless carefully cleansed or re-distilled is apt to be contaminated with a considerable proportion of a highly noxious and disagreeable species of *fusel oil* or feints, generated in the potatoe wort during fermentation. The spirit procured from the potatoe-*apple*, however, is said to be of excellent quality, and to present the closest approximation of any other spirit to true cognac; but it is understood that the potatoe-apple brandy is now manufactured on a very limited scale and that little, if any of it is exported from France.*

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* "The reduction of the duties upon foreign spirits, leaving a difference of only 5d. per gallon in favour of British manufacture, has caused the introduction into England of various imitations of French brandy, and large importations are arriving from Holland and the Mediterranean ports, with casks of spirit bearing most impudently the brand of Cognac; in fact it is known to the writer that many houses send over to Hamburgh fresh emptied casks, having the original brand of some of the best shippers of Cognac brandy. These casks are filled with Hamburgh spirit, pale or brown, at a cost of about 3s. per gallon at proof, and those who are not acquainted with the manœuvre are too often deceived by the external appearances. A favourable opportunity is given for this fraud by the brandy being generally sold in bond, and the impression upon the minds of the uninitiated is, that if they get their spirits direct from bond they are secure from imposition. The importer and dealer in this spurious brandy has a considerable advantage over the British rectifier; he sells the article in bond, his customer paying the duty, whilst the rectifier has to find capital for duty, runs altogether a greater risk, and whilst he supplies a very much better brandy, derives considerably less profit. If the spirit merchant requires any other than cognac brandy he may be assured that the English manufacture is infinitely superior to any we have mentioned, owing to the improvement in the stills, the boilers being worked with steam, by which means contact with the fire is

Cognac.—This is the well-known appellation of the best form of French brandy. Cognac is the name of a town which stands nearly at the centre of the vineyard districts in the western part of France, bounded on the east by the department of Charente and on the west by the department of lower Charente. The other French vineyards although much more extensive are of small importance compared with those lying in and within the departments of Charente.

Of the immense tract of vineyards so situated, the produce of only one-third is consumed as wine at home or abroad: the remaining portion is all devoted to the manufacture of brandy. There are two classes of this brandy—that which is produced in the plain

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prevented, all empyreumatic character is avoided, and the greatest care is now taken in order to procure a perfectly clean spirit. In this the majority of makers have succeeded, and by the addition of judicious flavouring, British brandy is infinitely superior to foreign fabrications. We have no national prejudice in making this assertion; it is founded upon the practical experience of very many years. We know that with the English manufacture the process is simple, and a genuine, wholesome spirit is obtained; whilst in the foreign importation, essential oils and deleterious drugs are used which render the spirit pernicious. We again repeat our opinion, and are prepared to support it, that there is no brandy manufactured abroad equal to our own British manufacture, excepting, of course, the produce of the grape; but in many wine districts the brandy is inferior to our corn spirit. The public should not be imposed upon by advertisements of "Imperial," "Patent," "Channel Islands," or other high-sounding titles. Let a respectable rectifier who understands his business produce his best British brandy, and he may challenge the foreign distiller to show its equal. It would be invidious of us to point out particular houses as famed for the excellence of their spirits. Such houses, however, may be easily discovered by those disposed to make the enquiry."—*Tovey on Foreign and British Spirits.*

of Champagne in the arrondissement of Cognac, of which again there are distinct qualities, Champagne fine and common, Champagne de Bois (wood champagne) Eau de Vie de Bois: and that of Annis, obtained from the vines planted on the banks of the river.*

The time for the manufacture of the brandy depends upon the time of the vintage. Grape-gathering seldom begins before the 15th September, and continues from then to the 15th October, according as the season is more or less favourable to the maturing of the grape. If the weather is fine, the gathering seldom occupies more than three weeks, but when unfavourable it may extend beyond four weeks. When the wine is of superior quality, owing to the season being really favourable to the maturity of the grape, a certain portion is exported to Paris, and other parts of France, for consumption, but this applies only to the red wine, and it is the red wine alone that is retained for the inhabitants in the district, whilst almost the whole of the white grapes are converted into brandy, and in the entire district three-fourths of the grapes grown are white.

The distillation commences when the wine is sufficiently fermented, or between All Saints' day (1st November) and Christmas.

The brandy called Fine Champagne, or Grand Champagne, is the finest quality that can be produced. The soil on which the vine grows, to which we owe

* The present account of the manufacture of Cognac is chiefly taken from Tovey's excellent work on Foreign and British Spirits.

this brandy, lies altogether in the arrondissement of Cognac. It is composed of very light earth, so light on the surface that it much resembles wood ashes, and the bottom is invariably chalk. Another quality of very fine brandy is called Little or Petite Champagne; and there is also a very fine brandy known as Premier Bois. These three qualities are mostly grown in the arrondissement of Cognac, or its immediate vicinity.

The white grape makes much better brandy than the red, only a very small portion of which is converted into spirit.

In good average years the *hectare* (2 acres 1⅞ roods English) of vines in the Charente departments yields from 40 to 50 *hectolitres* (about 22 gallons each) of wine; but when the vintage is abundant, it produces from 60 to 70 hectolitres. The average quantity of wine required to yield one hectolitre of brandy at proof is about eight hectolitres, that is, when the wine is of good quality. But in wet or unfavourable seasons when there is not much saccharine in the fruit or it has not come to perfect maturity, 11, 12, or even 13 hectolitres of wine are required to make one hectolitre of brandy at proof.

In the Champagne district the mode of culture is in alternate rows of vines and cereals. The ages of the vines vary considerably; in the same vineyard there may be a row of young plants one or two years old, of others three or four, of many from ten to twenty, and we have had pointed out to us some venerable old stocks declared to be one hundred years old and

upwards. The vine seldom bears fruit before it is four or five years old; it is most vigorous from the age of 15 to 30 years, but a great many bear well up to 50, 60, or 70 years, and some even give fair crops at the age of 100 years. The white grape generally succeeds better than the black in the Cognac district, especially in years when no great injury is done by frost. Within the last quarter of a century, the agriculturists in Charente have surprisingly improved in circumstances. Those who a few years since were mere labourers are now proprietors of land and growers. They are a very hard-working people—satisfied with very little of the plainest food, and they are exceedingly temperate—they drink the poor red wine, the produce of their own land, brandy they seldom if ever taste, diluted or otherwise. Nearly every farmer possesses a still, and distils the wine produced upon his farm. Some few small proprietors have no still, and sell their wine almost as soon as it is made to others, whose principal business it is to buy wine and distil it, and who, very soon after the brandy is made, come and offer it to the trader.

The stills used by the farmers are of a very primitive character, merely a simple boiler, head and worm. They vary but slightly in contents, generally containing from 2 to 2½ hectolitres. Some few large farmers or wine buyers use large and improved stills, by which they are enabled to distil quicker and more economically; but the character of the brandy is impaired in consequence, and preference is given to the spirit made in the small original stills, which is

more readily bought by the trade. Nothing can be more simple than the process adopted by the Cognac farmers, and the rude appearance of the distillery is somewhat amusing to persons accustomed to the magnitude and system of our English establishments. There are generally two stills in operation, and the fire is maintained with wood. Distillation once commenced is kept up day and night until all the spirit is judged to have been extracted from the wine. The low wines being re-distilled, the brandy is complete. Neither alkali nor charcoal is employed, and the spirit is not cleaned by filtration, and thus the whole of the essential oil not removed by the second distillation is retained.

A very general impression exists that much of the brandy received from Cognac is mixed with grain or beet-root spirit, and it is impossible to say that such is not the case with some that finds its way into the market at prices much below the average quotations. There are, however, very stringent enactments against the practice, and the tribunals of justice are very severe when they have proof of such cases. In the years 1857 and 1858, several farmers were convicted of offences of this kind, and committed to long terms of imprisonment. The punishments had a salutary effect, and contributed in a great degree to stop adulteration.

Brandy is imported in puncheons, hogsheads, and quarter casks.* The brandy costs in puncheons 2d.

* Shippers, as well as importers, are not all aware that the smallest quantity of foreign spirits allowed to be imported in casks

per gallon less than in hogsheads, and hogsheads are 3d. per gallon cheaper than quarter casks. Consequently brandy shipped in quarter casks is from 5d. to 6d. per gallon more than that shipped in puncheons. The ordinary strength at which brandy is shipped is about 4 per cent. over proof, and it is generally bonded in England at between 2 and 3 per cent. over proof. The very close system of gauging now adopted, charging both upon the quantity and strength to the tenth of a gallon, gives the merchant but little chance for wastage by sampling and racking, &c., and it is too frequently the case that duty is paid upon much more than is contained in the casks. There is no alternative for this but submission to the exaction.

The ordinary strength of brandy, as sold by dealers to the retailer, from duty paid stock, is 10 per cent. under proof. The retailer makes it up according to his own notions, or rather to the extent of that which his customers will bear. If the sophistication is simply that of water the vendor is a favourable specimen of his class, but it was too much the practice when there was a greater difference between the duties on foreign and British spirits, to mix equal proportions of British with foreign brandy; the

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for home consumption is 20 gallons. It is well that it should be so, the trade is already sufficiently lowered by the pedling business of hawking about small casks from bond. Much annoyance has been caused to some of the importers through ignorance of this regulation. A number of octaves of brandy was imported into Bristol, which upon being landed, the Customs marked with a broad arrow. (Seized as illegal.)

difference in duty is now but 5d. per gallon. Certainly the first cost of cognac is considerably more than it was some years ago. But, be that as it may, the retailer and publican would find it to their advantage, by increased trade and more general satisfaction, if they were to avoid the blending process. Nothing will ensure success sooner than vending such an article as brandy as pure as possible, avoiding all mixtures, and above all, the noxious ingredients that "publicans' druggists" introduce by their agents, who persuade the retailer to adulterate his brandy and other spirits. The result is too frequently the loss of both his trade and reputation.

Brandy, when first distilled, is like spirit obtained from all other sources, quite colourless; by mere keeping, however, it acquires a slight tinge, owing, probably, to some change in the properties of the soluble matter contained in it. The colour is much increased by storage in casks. Formerly but little uncoloured brandy was shipped to England. *White* brandy, as it was then termed, was a novelty in England, now, we presume, there is as much pale brandy imported as there is coloured, and perhaps more. The old Cognac houses are very particular in the quality of their colouring, and prepare it with great care; it is important too, that it should be old, and it is made up with old brandy. Consequently good old colouring imparts a fulness and roundness to brandy which is not to be met with in the uncoloured spirit, although the latter may merit the preference in character and delicacy.

There is a considerable loss in the apparent strength of brandy by the addition of colouring, the weight of the latter necessarily affects the gravity of the spirit, lowering it by the Hydrometer, if of deep colour, as much as 5 to 6 per cent., consequently brown brandy at proof by the instruments, is, in fact, generally 5 per cent. over proof; whilst the pale is the exact strength it is represented to be.

The consumption of brandy in England has varied with the duties levied upon it. As an illustration, in the five years from 1786 to 1790, the average quantity amounted to 1,731,041 gallons; and in the five years from 1831 to 1835, the average was only 1,379,547 gallons, the duty in the meantime having been advanced from 6s. to 22s. 6d. per gallon.

The other spirits besides Geneva, rum, and brandy produced in foreign countries never find their way into this kingdom, and need, therefore, no description in the present work.

CHAPTER IV.

STRENGTH OF SPIRITUOUS LIQUORS. PRINCIPLE AND USE OF THE HYDROMETER.

(1.) *Modes of Valuing Spirits.*—The value of a spirituous fluid depends both on its strength and its quality or goodness. By the term "strength" is meant the proportion of alcohol present: for ordinary purposes this is always estimated by measure and not by weight; the more alcohol any given bulk of a spirit contains, the stronger is that spirit said to be. In the commercial valuation of spirits, it is not the practice in this country, as it is on the Continent and in America, to make use of absolute alcohol as a standard. That which is here taken as the common standard of strength, consists of a mixture of alcohol and water in certain, definite, proportions, called "Proof Spirit." Such a mixture is found to be more convenient in most respects than would be a standard composed of undiluted alcohol; first, because absolute alcohol is very difficult of preparation, and is besides so volatile, and so prone to absorb water from the air and thus deteriorate in strength, that experiments with it seldom give accurate results; secondly, because spirituous liquors intended for consumption as

beverages are generally so much reduced in strength either by the intentional addition of water, or by the effects of age, as to contain less than half their bulk of absolute alcohol, and a better idea of their strength can therefore be formed by referring them to a standard which does not greatly exceed their own spirituous value. As regards strong spirits, it would certainly be more simple and advantageous to have a higher valuing point then that of British proof. In this case the fittest standard would seem to be rectified spirit at the greatest strength obtainable by distillation. The values of all weaker spirits could then be expressed at once naturally and intelligibly as being equal to so many parts in the hundred of the standard. Perhaps the only objection to this proposal would be the liability to mistakes and confusion from the existence of two different points of valuation; and if one of these were to be abolished, the public might be unwilling to give up the proof strength to which they have so long been accustomed. However, that may be, proof, as established by usage and Act of Parliament, is the sole standard at present recognised or referred to in the United Kingdom for the estimation of all degrees of spirituous strength.

According to law (58 Geo. III., cap. 28) Proof Spirit is defined to be, such spirit as at the temperature of 51 degrees of Fahrenheit's thermometer, shall weigh twelve-thirteenths of the weight of an equal measure of distilled water.

It is, no doubt, implied in this definition, that the

water and spirit shall be of the same temperature. If, therefore, distilled water at 51° Fah. be assumed as unity, the relative density or specific gravity of proof spirit at 51° Fah. will be $\frac{12}{13}$ of 1, or decimally, 0·92308. When proof spirit is referred to the more usual temperature of 60° Fah. its density is expressed by the decimal 0·91984. Spirit of proof strength contains very nearly equal *weights* of pure alcohol and water: the exact proportions, as determined by scientific experiment are—

Alcohol (spec. grav. 0·79381) - -	49·24
Water - - - - - - - - - - -	50·76
	100·

By *measure*, the proportions of the constituents are different. The following are found to be the relative quantities:—

Alcohol (as before) - - - - - -	57·06
Water - - - - - - - - - - - -	46·68
	103·74

The reason of these latter numbers being together in excess of 100, is that when alcohol and water are mixed, a condensation or lessening of bulk takes place, that is, the total quantity of the mixture measures less than the sum of the separate ingredients. In the present case, the 57·06 measures of alcohol and 46·68 of water contract into a smaller space when blended, and form only 100 measures of proof spirit. A considerable rise of temperature accompanies the act of condensation, owing to the heat that is liberated on the intimate union of the

elements. The greatest degree of condensation occurs when about 50 parts by measure of water and 54 parts of alcohol are mixed together, and amounts to nearly 4 per cent. The temperature of the mixture has been observed to rise as high as 20° Fah. It is remarkable, however, that when water is added, not to strong alcohol, but to a rather dilute spirit, the opposite effect, namely, expansion instead of contraction, takes place.

At first sight the continental method of valuing spirits, as being based on the actual quantity of pure alcohol present, appears superior to the mode adopted in this country; but so recently as 1836, the question of a new standard of value was considered by a Committee of the Royal Society, and after a deliberate examination of the subject that Committee reported, "that a definite mixture of alcohol and water, was preferable to pure alcohol as a standard, as being invariable in its nature, and more easily identified;" and they simply recommended, that in the event of any change being decided upon "the density of the standard or proof spirit, should be fixed at ·920, at 62° Fah., or about one per cent. weaker than at present."

(2.) *Sykes's Hydrometer and Tables.*—The legal mode of ascertaining the strength of spirit, and calculating the various equivalent quantities at proof, for the purposes of the Revenue and the trade in this country, is by means of a floating instrument known as Sykes's Hydrometer, and its accompanying table-book of strengths Every hydrometer acts on the principle,

that a solid body immersed in a fluid displaces exactly as much of that fluid as is equal in bulk to the portion of the body submerged; and that when the same body is made to float successively in liquids of different densities it will sink deepest in those which have the lowest density and *vicé versâ*. It will be evident, that by constructing a suitable instrument, with a graduated stem or index, and so contrived as to weight and buoyancy that it will not sink *below* the highest point of the graduated portion of the stem when placed in the lightest fluid it is intended to assay, and that when placed in water or the densest fluid to which it is to be applied, it will not float *above* the lowest division of the stem, the densities or specific gravities of all the fluids coming within the range of these indications may be readily determined: for all that is necessary is to ascertain beforehand the bulk of fluid displaced at each degree of the graduation, and to compare each such quantity with the bulk of *water* displaced by the same instrument when immersed to the same point in water. The *relative bulks of equal weights* of water and any other fluid will thus be determined, and the specific gravity of each fluid arrived at by a simple process of division. Suppose, for example, a hydrometer when floating in a certain spirit displaces 2 cubic inches of fluid, or what is the same thing, that the bulk of the immersed portion of the instrument measures 2 cubic inches, and that the bulk of the immersed portion when the instrument floats in water of an equal temperature is found to be $1\frac{3}{4}$ cubic

inches. Dividing the bulk in water by the bulk in spirit, that is, $1\frac{3}{4}$ or 1·75 by 2, we obtain the number 0·875 which expresses the relative density or specific gravity of that spirit. And similarly for all other cases. In practice the necessary bulks are determined, not by direct measurement of parts of the instrument, which would be difficult and inexact, but by adding or removing small weights at top until the hydrometer sinks or rises to any desired point in water, and then on the principle above laid down, treating such total modified weight as equivalent to the weight of water displaced at that point. This result can then be easily reduced to cubic inches from the known relations between the weight and bulk of any stated quantity of water.

Sykes's hydrometer is made of brass, or rather of a metallic compound resembling brass, and consists of a hollow spherical ball or float about an inch and a half in diameter, to which is attached below, a slender conical rod about an inch and a quarter in length, and which carries at its end a small pear-shaped bulb. for the purpose of giving the instrument the requisite stability when it is floated in a liquid. Above the bulb is attached the stem, which is hollow, flat, and graduated with a single scale into 10 equal divisions numbered from 1 to 10; each of which is subdivided into five fractional parts of two-tenths each. The length of this stem or index is about $3\frac{1}{2}$ inches, and the length of the entire instrument $6\frac{1}{2}$ inches nearly,

The hydrometer is accompanied by nine different poises or weights, of unequal size; the form of each

poise is that of a solid ring having a slit from the edge to the centre, where a small circular hole is made. This slit is of sufficient width to admit the insertion of the thinest part of the lower or conical stem of the instrument; and when a weight is thus applied to the stem and slid down it until it reaches and rests upon the bulb at bottom, the increased thickness of the conical rod retains the weight in its place, so that it may not fall off in the liquid. By means of these weights or poises, numbered respectively, 10, 20, 30, 40, 50, 60, 70, 80, 90, the hydrometer scale is extended to 100 divisions or 500 subdivisons, of which the units are read off on the graduated stem while the tens are given by the weights.

On the side or edge of the upper stem, near to the top, is a mark to which the weight 60 depresses the instrument in spirit of proof strength at the temperature of 51° Fah. As by the Act of Parliament establishing the use of this hydrometer, proof spirit is defined to be that which at 51° Fah. weighs $\frac{12}{13}$ of the weight of an equal bulk of distilled water, the instrument is, therefore, accompanied by a small, square, hollow weight which fits on to the top of the upper stem, and which weighs $\frac{1}{12}$ of the entire weight of the hydrometer and the 60 poise. This cap weight when added causes the instrument to sink in distilled water to the proof mark, and shews that its construction is in accordance with the definition of the Act of Parliament; and also supplies a ready means of testing at any time the accuracy of the instrument.

It should be understood that each successive weight

from that marked 10 upwards has, when applied at bottom, the effect of depressing the hydrometer the entire length of the scale deeper in the same spirit than the point at which it floated in it with the preceding lighter weight attached; and by this contrivance the same result is attained as if the scale of the instrument were nine times as long as it is. Thus, the hydrometer without a weight sinks to 10 on the stem in a liquid of the density ·8332 at 60° Fah. If now the 10 weight be affixed and the whole be again immersed in this spirit, it will sink to 0, the higher extremity of the scale, and when immersed in spirits of greater density will continue to indicate at different points of the stem until it becomes necessary to substitute the 20 weight, and so on.

An indication of Sykes's hydrometer consists merely of the number of one of the poises added to one of the degrees or divisions marked on the scale, and is in no way an expression of specific gravity. These arbitrary indications, it is true, lead to a knowledge of the corresponding specific gravities when the requisite data with respect to the weight, &c., of the instrument are supplied, but otherwise, the indications serve only to denote the several points of immersion, and as such are inserted in the Table of Strengths with the per-centage over or under proof opposite. On the average every subdivision of the scale shows a difference of three-tenths per cent. of proof spirit. The continental hydrometers do not indicate at intervals of less than one per cent., and are therefore much inferior in accuracy to Sykes's.

(3.) *System of Strengths.*—From elaborate and careful experiments made upon the densities of mixtures of different proportions of alcohol and water through a large range of temperature, the values of such mixtures in relation to the Standard of Proof have been computed and are embodied in Sykes's Table of Strengths. The general principle of the method of deriving these results will be sufficiently illustrated by a particular instance. First, it has been established, as already noticed, that the specific gravity of proof spirit at 60° Fah., is ·91984. Now, taking a spirit of the density ·825 at 60° as the standard, it appears from the experiments in question that proof spirit contains 61·57 per cent. (parts in the hundred) of this standard spirit, and that a spirit having the density, let it be supposed, of ·94135 at 60° contains 49·93 per cent. of the standard. It is evident then, that in order to find the proportion of proof spirit contained in the given spirit we have to divide 49·93 by 61·57, which gives for quotient, the decimal ·811, thus showing that one part by measure of the given spirit contains ·811 parts of proof spirit, or that one hundred parts contain 81·1.

The per-centage thus determined, when deducted from 100, shows the amount by which the value of the spirit falls short of the value of proof taken as 100. Accordingly, it is usual and convenient to say that a spirit weaker than proof spirit is so much "*Under Proof*"—in this case, 18·9 U.P. standing for under proof.

On the other hand, as regards spirits of a greater

strength than proof, the expression "per cent. Over Proof" is employed. Suppose a spirit of a certain specific gravity is found to contain 76 parts in the hundred of the standard spirit, and we wish to compute its relation per cent. to Proof Dividing 76 by 61·57 (the proportion of standard spirit in 100 parts of proof spirit, as already explained) we get the number 1·234, which shows that the values of the given spirit and proof spirit are to one another as 1 to 1·234 or as 100 to 123·4. The given spirit is therefore said to be of the strength of 23·4 per cent. O.P., (the letters O.P. signifying Over Proof.) We are to infer from this expression of value that one gallon of the given spirit is equal in point of strength or alcoholic richness to 1 $\frac{234}{1000}$ths galls. of proof spirit; and that if one gallon of the stronger spirit be diluted with ·234ths gall. of water, the strength of the mixture will be exactly that of proof.

In general, the two denominations of strength, O.P. and U.P. are to be regarded practically as indicating —an *over-proof* strength, the number which when *added* to 100 will represent the quantity of spirit at proof which 100 gallons of that particular over-proof strength would make by the addition of water; in other words, the *equivalent* of the given spirit at proof. An *under-proof* strength, the number which when *subtracted* from 100 shows the quantity of proof spirit which 100 gallons at that particular strength contain.

The *sum* in the first case, and the *remainder* in the second, serve as factors or multipliers for reducing any given quantity at the respective strengths to an

equivalent at proof, the product in each case being divided by 100.

Example (1). 130 bulk gallons at 10 per cent. O.P.
130 multiplied by 110 = 14300
And 14300 divided by 100 = 143, Answer.

From this result it appears, that 130 gallons of the strength of 10 per cent. O.P. are equivalent to 143 gallons of proof spirit.

(2). 130 bulk gallons at 10 per cent. U.P.
130 multiplied by 90 = 11700
And 11700 divided by 100 = 117, Answer.

Here it is seen, that 130 gallons of the strength of 10 per cent. U.P. are equivalent to 117 gallons of proof spirit.

In Sykes's Tables, each opening contains a series of two parallel columns, in the first of which are inserted the progressive indications of the hydrometer from 0 to 100, and opposite to each the strength per cent. in terms O.P. and U.P. of the spirit which gives that indication. Thus—

TEMPERATURE 60°

Weights and Divisns on Stem.	Per cent. Over Proof.	Weights and Divisions on Stem.	Per cent Over Proof.	Weights and Divisions on Stem.	Per cent. Under Proof.	Weig ts and Divisns on Stem.	Per cent. Under Proof.
0·	67·0	58·	1·3	96·	90·7	98·	95·9
·2	66·8	·2	1·0	·2	91·2	·2	96·4
·4	66·6	·4	·7	·4	91·7	·4	96·8
·6	66·5	·6	·3	·6	92·3	·6	97·3
·8	66·3	·8	———	·8	92·8	·8	97·7
1·	66·1	59·	·3	97·	93·3	99·	98·2
·2	65·9	·2	·6	·2	93·8	·2	98·7
·4	65·8	·4	·9	·4	94·3	·4	99·1
·6	65·6	·6	1·3	·6	94·9	·6	99·6
·8	65·5	·8	1·6	·8	95·4	·8	100·0
2·	65·3	60·	1·9	98·	95·9	100·	
&c.	&c.	&c.	&c.				

This is offered merely as a specimen of the manner in which the tables are arranged. The strong black line in the middle of the 2nd column indicates that it is there that proof occurs, and that the numbers below it in the same column are to be regarded as denoting strengths Under Proof.

As the apparent strength is considerably influenced by the temperature of the spirit, it becomes necessary to compute a separate table for each degree of temperature between 30° and 80° Fah., a range which comprehends nearly all the variations of heat likely to occur in the climate of this country. Consequently, the strength book consists of 46 distinct tables, each headed with its appropriate temperature.

It will be evident, that as heat enlarges or expands and as cold lessens or contracts the bulk of a liquid—and in an especial degree the bulk of spirits—the proportion of proof spirit *by measure* contained in any given quantity of a spirit must become smaller or greater according as that spirit becomes warmer or cooler. If, for instance, a particular spirit when at the temperature of 60° is shown to contain 85 parts in the hundred by measure of proof spirit, and the liquid be heated to, say, 70°, the bulk will undergo expansion, and any stated quantity of it, as for instance one gallon, will now contain *less* than 85 per cent. of the proof spirit, since this proportion has extended itself over a larger bulk of liquid. On the other hand if the spirit be cooled from 60° down to 50°, a diminution of the bulk will take place, the original proportion of proof spirit present will concentrate itself into a

smaller compass, and a gallon of the liquid will now contain *more* than 85 per cent. of the standard spirit; the strength per cent. will consequently be greater than at first.

Owing to these circumstances, it became necessary to make experiments on the change of bulk and density undergone by the same spirit when raised or lowered in temperature beyond the standard degree, and to construct a different table of strengths for each variation of the temperature.

What Sykes's tables really show, is the strength per cent. of any given sample of spirits *as it would be*, provided the temperature of the liquid were reduced to the standard point—51°—if at the time of trial the heat did not happen to be at that point. But the tables make no allowance for the alteration of bulk which is consequent on a change of temperature—an omission that has both its defects and its advantages. It must be evident, from what has just been stated, that a uniform system of values for spirits under all variations of temperature cannot give correct results—the proof equivalent once established at a certain degree of heat must vary to some extent, as the heat and, therefore, the bulk of the spirit varies. But it has to be considered, that the errors thus introduced are not so great, as to be of much practical importance, and it is desirable, for the sake of identifying a spirit whenever it may be examined, that the expression of its original strength should be so ordered as to remain the same under every condition of temperature. Accordingly all

attempts that have been made, from time to time, to rectify the fault in Sykes's tables have failed to bring about any modification of the system, as it is felt by the revenue authorities, that the proposed correction, although strictly in accordance with the rational theory of the subject, would be less simple and convenient than the method now in force.

It may be useful to repeat in this place, that however much the temperature of a spirit may differ at any time from the standard point, Sykes's tables are so formed as to assign to it one unalterable degree of strength. For example, let the hydrometer indication (weight and divisions on stem) be 37·0, and the temperature 42°. Opposite to 37·0 and under 42° in the tables is the strength 35·1 O.P. Now, suppose the spirit to be heated to 70°. On again applying the hydrometer, the indication will be found to have changed to 29·8, and opposite to this indication, under temperature 70°, appears in the tables, the strength 35·1 O.P. as before.

In many cases the tables will show a want of *perfect* coincidence in this respect. But the disagreement arises from an unavoidable inexactness in computing the several strengths, and not from a different principle being adopted.

The proper method of using the hydrometer and referring to the tables is so clearly explained in the Table-book accompanying each instrument, that it is needless to enter on the subject in this work.

CHAPTER V.

REDUCTION OF SPIRITS FROM ONE STRENGTH TO ANOTHER. COMPUTATION OF THE AVERAGE STRENGTH OF SPIRIT MIXTURES, ETC.

(1.) *Reduction of Spirits to Proof*—As explained in the last chapter, 100, the assumed numerical value of Proof strength, is supposed to be divided into 100 equal parts or degrees, and each of these again into tenths.

A spirit *stronger* than Proof is said to be so many degrees per cent. Over Proof (O.P.) and a spirit *weaker* than Proof, to be so many degrees Under Proof (U.P.) the term *per cent.* being here employed, not in its proper arithmetical sense, but merely to refer the expression of strength to 100. For example, a spirit at "25 per cent. O.P." is understood to be once and twenty-five hundredths or once and a quarter as strong as proof; it contains as much alcohol as proof spirit contains and 25 per cent. more. Similarly, "25 per cent. U.P." means that a spirit of that strength wants 25 parts in 100 of being as strong as proof, or that 75 parts out of the 100 consists of proof spirit and the remainder of water. *In valuing spirits, it is always assumed that the mixture is composed of water and alcohol only*, or that any other substances

present are so minute in quantity that they may be neglected without causing any error worth consideration. The proof value of any spirit of given strength is expressed, therefore, by adding degrees O.P. to 100, and subtracting degrees U.P. from 100: thus, the value of a spirit at 60 O.P. is represented by 160 (=100+60) and the value of a spirit at 60 U.P. by 40 (=100—60).

In the former case, 100 gallons of the spirit are equal in value to 160 gallons, and in the latter case, to only 40 gallons, at proof strength. But if we divide the value of 100 gallons in any instance by 100, we shall obtain a factor or multiplier which will reduce any quantity of spirits to an equivalent at proof. As 100 gallons at 60 O.P. are equal in value to 160 at proof, 1 gallon is equal to 1·60 at proof, and so on. Hence, a general rule for reducing spirits of a given strength to proof. RULE.—*Add degrees* O.P. *to* 100: *and subtract degrees* U.P. *from* 100: *divide the sum or difference by* 100, *and multiply the given quantity by the number so obtained.*

Example (1). Reduce to proof 170 gallons of spirits at 12·5, 35·7, and 54·0 per cent O.P. respectively.

	(1.)	(2.)	(3.)
Degrees O.P.	12·5	35·7	54
Add	100	100	100
	112·5	135·7	154
Factors	1·125	1·357	1·54
	170	170	170
Gallons at Proof	191·25	230·69	261·8

Example (2). Reduce to proof 93 gallons at 16·9, 21·4, and 80·0 per cent. U.P. respectively.

	(4.)	(5.)	(6.)
	100	100	100
Subtract degrees U.P.	16·9	21·4	80
	83·1	78·6	20
Factors	·831	·786	·20
	93	93	93
	2493	2358	
	7479	7074	
Gallons at Proof	77·283	73·098	18·6

Another method.—Spirits may also be reduced to proof in the following manner: multiply the quantity by the rate per cent. O.P. or U.P. divided by 100. If the given strength be O.P., add this product to the quantity; if U.P., subtract it from the quantity, thus—

	(1.)
Degrees O.P. divided by 100	·125
	170
Excess O.P.	21·25
Add, bulk gallons	170
Gallons at proof	191·25

	(4.)
Degrees U.P. divided by 100	·169
	93
	507
	1521
Subtract defect U.P.	15·717
Bulk gallons	93
	77·283

(2.) *Reduction of spirits from any given to any required strength per cent.* O.P. *or* U.P.—RULE.—Add degrees O.P. to 100, and subtract degrees U.P. from 100: then multiply the quantity by the *given* strength, and divide the result by the *required* strength.

Example (1). To reduce 832 galls. of spirits at 32·4 per cent. O.P. to an equivalent quantity at 28 per cent. O.P. and 28 per cent. U.P. respectively.

```
Multiplier for given strength  132·4
Quantity . . . . .              832
                                ----
                                2648
                               3972
                              10592
                              -------
Divisor for required strength 128)110156·8(860·6
                                  775
                                    768
                                      0
```

Answer 860·6 galls. at 28 per cent. O.P.

```
Divisor for required strength 72)110156·8(1529·9
                                 381
                                  215
                                   716
                                    688
                                     40
```

Answer 1529·9 galls. at 28 per cent. U.P.

A proof of the correctness of these results may be thus exhibited: 832 galls. at 32·4 per cent. O.P. are equivalent to 1101·5 galls. at proof, for $832 \times 1{\cdot}324 = 1101{\cdot}5$; and 860·6 galls. at 28 per cent. O.P. are also equivalent to 1101·5 galls. at proof, for $860{\cdot}6 \times 1{\cdot}28$

=1101·5. Similarly, 1529·9 galls. at 28 per cent. U.P. are equivalent to 1101·5 proof galls. for 1529·9 ×72=1101·5.

Example (2). What is the equivalent quantity at 5·8 per cent. U.P., of 765 gallons of spirits at 11·5 per cent. U.P.? *

```
                                  Factor for given strength   88·5
                                  Quantity . . . . .         765
                                                             ----
                                                             4425
                                                            5310
                                                           6195
                                                           -----
Divisor for required strength   94·2)677025(718·7
                                       1762
                                        8205
                                         6690
                                           96
```

Answer 718·7 gallons at 5·8 per cent. U.P.

(3.) *To find the quantity of water requisite for reducing spirits from any given strength, to any other lower strength.* General Rule.—Multiply the given quan-

* As to the reason of the preceding general rule for reducing spirits from any one strength to an equivalent at any other, it will be obvious that when the given quantity is multiplied by the factor for the given strength, it is thus reduced to its equivalent at proof, and in order to find what quantity at the required strength corresponds to these gallons at proof, our process must be the reverse of that which is used in reducing *to* proof, that is, we must *divide* the proof quantity by the factor for the required strength. Such a number must be obtained as will, when multiplied by the factor for the required strength, give that proof quantity; so that in the latter part of the operation we have to solve the question—Given a quantity at proof, to find its equivalent at a certain specified strength higher or lower than proof, and the rule for this is evidently the converse of that for reducing spirits at a stated strength *to* proof.

tity by the difference between the higher and lower strengths, and divide the product by the lower strength —first having added rates per cent. O.P. to 100, and subtracted rates per cent. U.P. from 100.

Example (1). How much water is needed to reduce 154 gallons of spirits from 24·8 per cent. O.P. to 11·6 per cent. O.P. proof; and 31 per cent. U.P. respectively?

Higher strength	124·8	124·8	124·8
Lower do. . .	111·6	100·0	69·0
	13·2	24·8	55·8
	154	154	154
	528	992	2232
	1980	3720	8370
	111·6)2032·8(18·2	100)3819·2(38·2	69)85932(124·5
	9168		169
	2400		313
	168		372
			27

Answers. 18·2, 38·2, 124·5 } Gallons water respectively.

When the higher and lower strengths are both on the same side of proof, that is, both O.P. or U.P. there is no occasion in taking their difference, to add them to or subtract them from 100, since, for example, 124·8 *less* 101·6 is the same as 24·8 *less* 11·6, but the lower strength when used as a divisor must always be the sum or difference of the rate per cent. and 100.*

* The principle of the foregoing rule and operations is simply this: As 100 gallons at 24·8 per cent. O.P. are equal in value to 124·8 gallons at proof, it follows, that if the bulk of 100 gallons at 24·8 O.P., be made up with water, syrup, or any other liquid devoid of spirit, to 124·8 gallons, the mixture will have the strength of

Example (2). How much water will reduce 200 gallons of spirits at proof to 22 per cent. U.P.?

1st method.

```
  100
   78
  ---
   22
  200
  ----
78)4400(56·4
   500
    320
      8
```

2nd method.

```
  100
  200
  ----
78)20000(256·4
    440  200·
     500  ----
      320  56·4
        8
```

Answer 56·4 gallons.

---

proof,—it will contain all the original spirit diluted to the extent of 124·8 gallons, and where the strength was 24·8 O.P. it will now be only proof. But the difference between the present and the previous bulk—24·8 gallons—does not represent the *whole* of the water necessary to effect the reduction of the spirit in question to proof strength. When spirits and water are mixed, a condensation or lessening of bulk takes place, that is, the bulk of the mixture is always less than the sum of the bulks of the ingredients when separate, and the amount of this condensation can be determined only by experiment for each varying proportion of spirits and water. All that may properly be inferred, therefore, from any expression of strength, such as 24·8 per cent. O.P., with regard to the quantity of water, &c., required to reduce a spirit of that strength to proof, is that 100 gallons at 24·8 per cent. O.P., if increased in bulk by the addition of water, &c., to 124·8 gallons will then have the strength of proof; or generally, the water which must be used to effect a given reduction of strength exceeds the quantity assigned by calculation. In the case of a spirit having the strength of 24·8 per cent. O.P., about 26 gallons of water are really required to lower 100 gallons to proof, the condensation which occurs diminishing the bulk of the whole from 126 to 124·8 gallons. It is customary, however, in the business of reduction, to add water in the proportion suggested by the strength of the spirit, and if an accurate result be desired, to dilute the mixture a little further, until a sample tested by the hydrometer shows that the right degree of

(4.) *To reduce spirits from any given to any required strength by the use of other spirits.*—RULE.—"Add rates per cent. to 100 or subtract from 100, as the case may be. Then multiply the given quantity by the difference between the given and the required strengths, and divide by the difference between the required strength and that of the spirits to be added."*

Example (1). What quantity of spirits at proof is necessary to raise 50 gallons at 15 per cent. U.P., to 10 per cent. U.P.?

Given strength	85	(15 U.P.)
Required ditto	90	(10 U.P.)
Difference	5	
Quantity of spirit	50	
Difference between strength of spirits to be added and required strength...	10)250	
	25 galls. Answer.	

strength has been reached; but for the ordinary purposes of trade a simple arithmetical process, such as is here exemplified, with a small practical allowance for condensation, is all that is adopted.

As 100 gallons of spirits at 24·8 per cent. O.P. need the addition of 24·8 (calculated) gallons of water, or as 1 gallon such spirit needs ·248 gallons of water, to render the whole of proof strength, 154 gallons of the spirit require evidently, 154×·248=38·2 gallons of water, the result arrived at in the second of the examples immediately preceding.

* Questions of the class included under (4) are in reality solved by an application of the rule of arithmetic called "Alligation." The rule given in words above is merely a convenient summary of the arithmetical process. For an account of the reason of the rule, see Loftus's New Spirit Calculator, page 28. Foot note.

PROOF.

Gallons at 15 per cent. U.P.	50
	85
At proof	42·50
Add	25·
Total proof	67·50
Given quantity	50
Required ditto	25
Sum	75
Required strength	90
Proof	67·50

Example (2). A spirit retailer in reducing rum. having accidently added so much water as to produce 312 gallons at 14·5 U.P., or 2·5 degrees lower then the desired strength, proposes to raise the strength to 12 per cent. U.P. by the admixture of other rum 32 per cent. O.P. How much of the latter spirit must he introduce to effect this object?

Strength of given quantity, 85·5: required strength 88. Difference between strength of spirit to be added and required strength, 44.

```
        88
        85·5
        ----
         2·5
         312
        ----
        1560
        624
        ----
   44)780·0(17·7
      44
      ---
      340
      308
      ---
       320      Answer 17·7 galls.
```

PROOF.—312 gallons at 14·5 U.P.=266·76 at proof.
17·7 „ 32· O.P.= 23·36 „

329·7 290·12

329·7 gallons at 12 U.P.=290·13

(5.) *To find the average strength when spirits of different quantities and degrees of strength are mixed together.*

RULE.—"Multiply each quantity by its strength, and divide the total of the products by the entire number of gallons."*

Example.—If 60 gallons at 20 per cent. O.P. be mixed with 112 gallons at 16 per cent. U.P., what would be the strength of the compound?

* For the reason of these and the following rules, see Loftus's Spirit Calculator page 33, &c.

Given quantity	60		112
,, strength	120		84
Product	7200		448
			896
		60	9408
		112	7200
Sum of quantities		172)	16608(96·5
			1548
			1128
			1032
			960
			860
Answer 3·5 per cent U.P.			100

(**6.**) *To find the mean rate or price of the compound when spirits of different quantities and prices are mixed together.*

RULE.—"Multiply each quantity by its price, and divide the sum of the products by the total number of gallons."

Example.—If 12 gallons of water be mixed with 55 gallons of spirits, worth 12s. per gallon, what will be the value of the mixture per gallon?

Quantities.		Prices.		Products.
55	multiplied by	12	gives	660
12	,,	0	,,	0
67				660

67)660(9s. 10d. Answer.

(7.) *The value or price of spirits at a particular strength being given, to find the proportionate value at any other strength.*

RULE.—"Multiply the price per gallon by the required strength, and divide by the given strength."

Example.—If spirits at proof be worth 30s. per gallon, what would their value be at 25 O.P.?

Price per gallon 30s.
Required strength 125
——— Answer.
Given strength 100)3750(37.5 or 37s. 6d. per gallon.

(8.) *The strength and value, or price at that strength being given, to find the proportionate strength at any other price.*

RULE.—"Multiply the given strength by the required price, and divide by the given price."

Example.—If spirits at 25 O.P. be worth 40s. per gallon, what strength should they possess if the price were 32s. per gallon?

Given strength 125
Required price 32
———
250
375
———
Given price 40)4000(100
Answer, 100, or proof.

(9.) *To find the quantity of water requisite for reducing spirits to any given value.*

RULE.—"Multiply the quantity of spirits by the difference between the given and required value per gallon, and divide by the required value."

Example.—How much water is needed to lower 78 gallons of spirit in price from 16s. 6d. to 13s. 4d. per gallon.

```
        78
        38
      ----
       624
      234
    -------
160)2964(18·5 gallons   Answer.
    160
    ----
    1364
    1280
    -----
     840
     800
     ---
      40
```

Questions under the three last heads (7, 8 and 9), may all be solved with great facility and exactness by an instrument called the "comparative rule," the use of which is very easily acquired. See advertisement at end.

The whole subject of spirit reduction and valuation is fully treated of in Loftus's New Spirit Calculator, wherein will be found numerous detailed examples worked out at length, of all the cases that can possibly occur in practice, with an appendix of "reducing tables" to save the trouble of calculation.

CHAPTER VI.

HINTS ON THE MANAGEMENT OF SPIRITS.

(1.) In reducing spirits always use, if possible, water that has been boiled a short time and allowed to cool. Hard water of any kind contains lime, which strong spirit is apt to throw down, thus giving when freshly added, an unpleasant milkiness to the liquor that takes generally some days to clear off or subside. Even when the reduced spirit clarifies itself by standing, the collection of lees at the bottom of the vessel prevents the whole of the contents being drawn off in a saleable condition, and also imparts a mawkish, disagreeable, taste.

(2.) If you wish to be very precise as to selling strengths, you must add rather more water than the quantity found by calculation. But it is better for your reputation and your interest to err on the side of a deficiency rather than an excess of water. The hydrometer is the only safe guide in the business of reducing. After mixing in the calculated quantity of water, try a sample with the hydrometer, and if the desired point of strength be not hit sufficiently nearly, put in a *little* more water and apply the instrument again, and so on, until you satisfy your-

self. A grocer might as well try to weigh raisins without a pair of scales or a balance of some kind, as a spirit merchant hope to reduce his goods properly without the aid of a correct hydrometer. Guess-work never answers in a trade requiring so much precision, and where the articles dealt in fetch so high a price.

(3.) In selecting spirits, especially rum, see that they have no marked flavour except what naturally belongs to them, likely to prove disagreeable to your customers. Rum of the more common brands is often smoky, woody, oily, &c. To give the samples a fair trial, mix a little of the spirit with warm water in a large glass. The heat brings out the aroma and flavour, and greatly assists the judgment of the purchaser: it is also a good plan to rub a little spirit smartly between the hands, and then put the nose close in between the joined palms. Brandy is very usefully tested in this way.

(4.) Never be induced to employ any of the means which are sometimes recommended by dishonest persons for giving a false appearance of strength and quality to your spirits. Such practices invariably lead to discredit and loss of custom, as if not directly discovered, the materials used for the purpose, in however small a quantity, are of a pernicious nature, and must inevitably injure the health of a regular consumer. Especially beware of the use of oil of vitriol and oil of bitter almonds, which are so commonly resorted to with a view of imparting a good bead or head.

(5.) Do not bung down spirits until they are ascertained to be clear. If they prove not to be bright and fine at the first running draw a quart or two from the tap until the cloudiness disappears, which will always be the case when the foulness arises from the part of the spirit lying around the tap. To show off your goods to advantage in a perfectly open and legitimate manner, hold the glass a considerable distance from the mouth of the tap, and let the spirit run rather slowly. This expedient makes the spirit carry a better bead.

(6.) All spirit taps should be taken out and boiled in mutton suet twice a year, to remove verdigris and prevent contamination of the spirit.

(7.) Peppermint, aniseed, and indeed all cordials and liqueurs should be kept in vessels appropriated to the same kind of goods: otherwise there would be great danger of spoiling the flavour of other spirits which through mistake might be put into one of these casks.

(8.) The great secret of obtaining mild, palatable, whisky, is to blend several varieties of the same kind of spirit together. The produce of one distillery may be too smoky, of another too harsh, of another too feinty, &c. By a judicious union of all, the faults of each will be in a great measure corrected. It is said that a little raisin or orange wine wonderfully softens and improves new whisky, but an honest article should not require such treatment.

(9.) A small quantity of the extremely high flavoured (and high priced) whisky made in the island of Islay, will suffice to give the true Scotch "smack" to a large stock of plain spirit.

For a summary of the laws and regulations applicable to the trade of spirit dealers, publicans, &c., see Loftus's Innkeepers' Laws, price 1s. 6d.

REDUCING TABLES.

*REDUCING TABLES.

The following Reducing Tables are taken from the Publicans' Guide, and will be found very useful to the publican in making up small quantities of spirits for retail trade.

The lowest strength allowed by the Excise is as follows:—Rum, Brandy and Whiskey, 25 under proof; and Gin, 35 under proof.

17 UNDER PROOF REDUCED TO 22 UNDER PROOF.					17 UNDER PROOF REDUCED TO 25 UNDER PROOF.				
Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.	Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	...	1	...	2	5	...	2	...	2½
10	...	2	1	...	10	1	...	...	3
20	1	1	...	...	20	2	...	·1	2
30	1	3	1	...	30	3	...	1	2
40	2	2	...	...	40	4	1	1	...
50	3	1	...	...	50	5	1	1	...
60	3	3	...	...	60	6	1	1	...
70	4	2	...	...	70	7	2	...	...
80	5	1	...	...	80	8	2	...	...
90	5	3	...	...	90	9	3	...	...
100	6	2	...	...	100	10	3	...	...

* The Publicans' Guide, containing nearly four thousand examples for Reducing Spirits, price 2s. 6d., Post Free.

17 UNDER PROOF REDUCED TO 30 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	...	3	1	1½
10	1	3	...	3
20	3	2	1	2
30	5	2	...	2
40	7	1	1	...
50	9	1	...	...
60	11	...	1	...
70	13	...	...	...
80	14	3	...	...
90	16	2	1	...
100	18	2	...	...

17 UNDER PROOF REDUCED TO 35 UNDER PROOF.

Spirits Galls,	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	1	1	...
10	2	3	...	...
20	5	2	...	...
30	8	1	...	2
40	11	...	...	...
50	13	3	1	...
60	16	2	1	...
70	19	2	...	...
80	22	...	...	...
90	25	...	...	...
100	27	3	...	...

PROOF REDUCED TO 5 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	...	1	...	1
10	...	2	...	2
20	1	...	1	...
30	1	2	1	...
40	2	1	...	...
50	2	3	...	...
60	3	1	...	...
70	3	3	...	...
80	4	1	...	...
90	5	...	...	...
100	5	2	...	...

PROOF REDUCED TO 10 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	...	2	...	2
10	1	...	1	...
20	2	1	...	...
30	3	1	1	...
40	4	2	...	...
50	5	2	1	...
60	6	3	...	...
70	7	3	...	...
80	9	...	...	...
90	10	...	...	...
100	11	1	...	...

PROOF
REDUCED TO
17 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts	Water Pints.	Water Qtns.
5	1	...	...	1
10	2	...	...	2
20	4	...	1	...
30	6	1	...	...
40	8	1	...	...
50	10	1	1	...
60	12	2	...	...
70	14	2	...	...
80	16	2	...	...
90	18	2	...	...
100	20	3	...	...

PROOF
REDUCED TO
20 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	1	...	...
10	2	2	...	...
20	5	...	...	...
30	7	2	...	...
40	10	...	...	...
50	12	2	...	...
60	15	...	...	...
70	17	2	...	...
80	20	...	...	...
90	22	2	...	...
100	25	...	...	...

PROOF
REDUCED TO
22 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	1	1	1
10	2	3	...	2
20	5	2	1	...
30	8	2	...	...
40	11	1	...	...
50	14	...	1	...
60	17	...	...	...
70	19	3	...	...
80	22	2	...	...
90	25	1	...	...
100	28	1	...	...

PROOF
REDUCED TO
25 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	2	1	1
10	3	1	...	2
20	6	2	1	...
30	10	...	...	...
40	13	1	...	...
50	16	3	...	...
60	20	...	...	...
70	23	2	...	...
80	26	2	...	...
90	30	...	...	...
100	33	2	...	...

PROOF
REDUCED TO
30 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts	Water Pints.	Water Qtns.
5	2	...	1	1
10	4	1	...	2
20	8	2	1	...
30	13	...	...	...
40	17	1	...	...
50	21	2	...	...
60	25	3	...	...
70	30	...	...	...
80	34	2	...	...
90	38	3	...	...
100	43	...	...	...

PROOF
REDUCED TO
35 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	2	1	2½
10	5	1	1	1
20	10	3	...	2
30	16	1	...	...
40	21	2	1	...
50	27	...	...	...
60	32	2	...	...
70	37	3	...	...
80	43	...	1	...
90	48	3	...	...
100	54	...	...	...

10 OVER PROOF
REDUCED TO
10 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	...	1	3½
10	2	...	1	3
20	4	1	1	2
30	6	2	1	...
40	8	3	1	...
50	11	1	...	...
60	13	1	...	...
70	15	2	...	...
80	17	3	...	...
90	20	...	...	...
100	22	1	...	...

10 OVER PROOF
REDUCED TO
20 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	3	1	...
10	3	3	...	...
20	7	2	...	...
30	11	1	...	...
40	15	...	...	...
50	18	3	...	...
60	22	2	...	...
70	26	1	...	...
80	30	...	...	...
90	33	3	...	...
100	37	2	...	...

10 OVER PROOF REDUCED TO 25 UNDER PROOF.					20 OVER PROOF REDUCED TO 10 UNDER PROOF.				
Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.	Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	1	...	3	5	1	2	1	½
10	4	2	1	2	10	3	1	...	3
20	9	1	1	...	20	6	2	1	2
30	14	...	...	...	30	10	...	...	...
40	18	3	...	...	40	13	1	1	...
50	23	1	...	...	50	16	3	1	...
60	28	...	...	...	60	20	...	...	...
70	32	2	...	...	70	23	2	...	...
80	37	1	...	...	80	26	3	...	...
90	42	...	...	...	90	30	1	...	...
100	46	2	...	...	100	33	3	...	...

20 OVER PROOF REDUCED TO 15 UNDER PROOF.					20 OVER PROOF REDUCED TO 25 UNDER PROOF.				
Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.	Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	...	...	2	5	3	...	...	½
10	4	...	1	...	10	6	...	...	1
20	8	1	...	...	20	12	...	...	2
30	12	1	1	...	30	18	...	1	...
40	16	2	...	...	40	24	...	1	...
50	20	3	...	...	50	30	1	...	...
60	24	3	...	...	60	36	1	...	...
70	28	3	1	...	70	42	1	...	...
80	33	...	...	...	80	48	1	...	...
90	37	1	...	...	90	54	1	...	...
100	41	2	...	...	100	60	2	...	...

25 OVER PROOF REDUCED TO 5 UNDER PROOF.					25 OVER PROOF REDUCED TO 10 UNDER PROOF.				
Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.	Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	2	...	3	5	1	3	1	2½
10	3	...	1	2	10	3	3	1	1
20	6	1	1	...	20	7	3	...	2
30	9	2	...	2	30	11	3	...	...
40	12	3	...	...	40	15	2	1	...
50	16	...	1	...	50	19	2	1	...
60	19	...	1	...	60	23	2	...	...
70	22	2	...	...	70	27	2	...	...
80	25	2	...	...	80	31	1	...	...
90	28	3	...	...	90	35	...	1	...
100	32	1	...	...	100	39	1	...	...

25 OVER PROOF REDUCED TO 22 UNDER PROOF.					25 OVER PROOF REDUCED TO 25 UNDER PROOF.				
Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.	Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	3	...	...	1	5	3	1	...	3
10	6	...	...	2	10	6	2	1	2½
20	12	...	1	...	20	13	1	1	1
30	18	...	1	...	30	20	...	...	...
40	24	1	...	...	40	26	3	...	2
50	30	1	...	...	50	33	2	...	...
60	36	1	...	...	60	40	...	...	...
70	42	2	...	...	70	47	...	...	...
80	48	2	...	...	80	53	2	1	...
90	54	2	...	...	90	60	...	...	...
100	60	2	...	...	100	67	...	...	...

30 OVER PROOF REDUCED TO 5 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	1	3	...	3
10	3	2	1	2
20	7	1	1	...
30	11	...	1	...
40	14	3	...	2
50	18	2	1	...
60	22	1	...	...
70	26	...	...	...
80	29	2	1	...
90	33	1	...	...
100	37	1	...	...

30 OVER PROOF REDUCED TO 10 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	...	1	3
10	4	1	1	2
20	8	3	1	...
30	13	1	1	...
40	17	3	...	...
50	22	1	...	...
60	26	3	...	...
70	31	...	...	...
80	35	2	...	...
90	40	...	...	...
100	44	2	...	...

30 OVER PROOF REDUCED TO 17 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	3	...	2½
10	5	2	1	1
20	11	1	...	2
30	17	...	...	2
40	22	2	1	...
50	28	1	1	...
60	34	...	1	...
70	39	3	1	...
80	45	1	...	...
90	51	...	1	...
100	56	3	...	...

30 OVER PROOF REDUCED TO 25 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	3	2	1	1½
10	7	1	...	3
20	14	2	1	2
30	22	...	...	...
40	29	1	1	...
50	36	3	...	...
60	44	...	...	...
70	51	2	...	...
80	58	3	...	...
90	66	...	...	...
100	73	2	...	...

35 OVER PROOF REDUCED TO 5 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	...	1	...
10	4	1	...	...
20	8	2	...	...
30	12	2	1	...
40	17	...	...	...
50	21	1	...	...
60	25	1	1	...
70	29	2	1	...
80	34	...	...	...
90	38	1	...	...
100	42	2	...	...

35 OVER PROOF REDUCED TO 10 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	2	2	...	...
10	5	...	...	...
20	10	...	...	...
30	15	...	...	...
40	20	...	...	...
50	25	...	...	...
60	30	...	...	...
70	35	...	...	...
80	40	...	...	...
90	45	...	...	...
100	50	...	...	...

35 OVER PROOF REDUCED TO 17 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	3	...	1	1
10	6	1	...	1½
20	12	2	...	3
30	18	3	1	...
40	25	...	1	2
50	31	2	...	...
60	37	3	...	...
70	44	...	...	...
80	50	1	1	...
90	56	2	...	...
100	63	...	...	...

35 OVER PROOF REDUCED TO 25 UNDER PROOF.

Spirits Galls.	Water Galls.	Water Qts.	Water Pints.	Water Qtns.
5	4	...	...	...
10	8	...	...	...
20	16	...	...	...
30	24	...	...	...
40	32	...	...	...
50	40	...	...	...
60	48	...	...	...
70	56	...	...	...
80	64	...	...	...
90	72	...	...	...
100	80	...	...	...

PLAIN DIRECTIONS FOR GAUGING AND FIXING VESSELS.

GAUGING AND FIXING VESSELS.

PLAIN DIRECTIONS FOR ASCERTAINING THE CONTENTS, FULL AND PARTIAL, OF ALL ORDINARY-SHAPED CASKS AND OTHER VESSELS USED IN THE WINE AND SPIRIT TRADE, WITHOUT THE AID OF SPECIAL INSTRUMENTS.

THE object of this short treatise is to show practical men, not versed in mathematics or the art of scientific gauging, how they can most simply and easily find the capacity of the vessels ordinarily used in their business, with all necessary correctness, and with no other instruments or apparatus than a straight rod or two and a common measuring tape.

It is true that the requisite dimensions can in every case be taken most conveniently by specially-prepared rods, &c. But apart from the cost of these, considerable training and practice, as well as some mathematical knowledge, are indispensable to their proper employment. None but Revenue officers, or persons who make gauging their profession and regular occupation, would think of providing themselves with such elaborate appliances merely for the purpose of an occasional measurement.

A very rough and ready, though sufficiently accurate, method may be acquired, which, with a little care, will give results as near the truth as can in any ordinary case be desired.

The calculations to be performed demand no knowledge of arithmetic beyond that of the first four rules in whole numbers and decimals; and of the latter, the only one that offers the least difficulty to beginners is the right placing of the decimal point in multiplication and division. For instruction in this subject, reference must be made to a treatise on arithmetic.

Straight-lined vessels.—The measurement of all square, rectangular and triangular-shaped vessels proceeds on the most simple principles, and is the most easily executed of every kind of gauging.

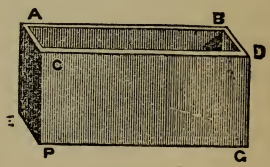


Fig. 1.

Suppose it required to know how much an oblong cistern of regular form, such as that figured in the margin, will hold, both when full and when filled only to part of its depth. All that need be done is to procure a long straight lath, mark it off by means of a short graduated rule or tape into inches and half-inches; or a correctly divided tape will do as well; then, by applying the rod or tape along the outer edges of the length, the breadth, and the depth of the cistern, all the necessary dimensions can be obtained in a few moments. An allowance must then be made for the thickness of the wood or metal of which the vessel is made before the calculation of

the content is undertaken. If the *inside* length, breadth and depth are measured directly by the tape—and this, whenever practicable, will be the better way—no such allowance is of course required. If greater nicety is wanted than can be attained by the use of the tape or a rule divided into half-inches, a more closely-graduated measure must be used, say one divided into tenths of an inch; but for all ordinary commercial purposes, half-inches are quite near enough.

In order to provide for the slight deviations from a regular or symmetrical shape, which are found in the best constructed vessels, it is advisable to take two or more dimensions in each of the three directions, and use the average result as the true length, &c.

Let the length, A B or P G, of a cistern such as that figured above be 120 inches, the breadth, E P, 65·5 inches, and the depth, D G, 21·5 inches. Required the full content in gallons—(each of these dimsnsions is supposed to be the average of two or more measurements, less the necessary allowance for the thickness of the metal or wood.)

Rule.—Multiply together the given length and breadth, and divide the product by 277, the number of cubic inches (omitting fractions) in a gallon. This gives the

(so-called) *area* * of the vessel at one inch deep. To find the total content, multiply by the depth.

Example :—

```
      65·5
       120
    ------
277)7860(28·37
    554
    ----
    2320
    2216
     ----
     1040
      831
      ----
      2090
```

Area, 28·37, call it 28·4. Then, for the content, we multiply the area by 21·5, the given depth.

```
    28·4
    21·5
    ----
    1420
    284
   568
   -----
   610·60
```

Total content, 610 gallons.

The preceding operation is so simple and so easily performed that a second example must be unnecessary.

---

* *See* page 332.

In the case of rectangular vessels of regular or nearly regular shape, as in the present instance, the quantity of any required part of the depth is at once found by taking the fraction of the entire content corresponding to the fraction of the total depth; or, more simply still, by multiplying the area by the partial depth. Thus, supposing the partial depth to be 16 inches:—

```
Area  28·4
        16
      ----
      1704
      284
      ----
     454·4
```

Answer 454 gallons at 16 inches deep.

Circular and oval-shaped vessels.—When we have to deal with a vessel of uniform circular shape (a cylinder), such as a round vat or tub having the same diameter (width) throughout, the process for finding the content is to measure the diameter at top or bottom, and also the total height or length, making allowance as before for the thickness of the wood, if the diameter is taken outside. Then let the area corresponding to the diameter be computed, and multiplied by the height or depth. This gives the full content, proportional parts of which may be taken for fractions of the total depth.

To obtain the true diameter, care must be taken to measure straight through the centre of the circular surface at top or bottom. It will not do to trust to the eye alone in so important a matter as this.

Draw with chalk or pencil a straight line anywhere, such as A B, from point to point of the circumference. Through the middle point, D, of A B draw the perpendicular, E F. This is a true diameter of the circle. It is advisable, however, to check the accuracy of the first determination by drawing other lines in the same manner, and seeing whether they are equal.

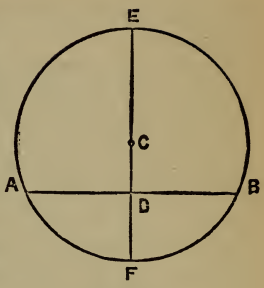


Fig. 2.

If from any cause the diameter cannot be measured directly, it can be calculated with great correctness from the circumference, where that can be ascertained by measurement round the outside of the vessel, allowance being of course made for the thickness of the wood.

To obtain the diameter from the circumference, the Rule (sufficiently exact for most purposes) is, Multiply by 7 and divide by 22.

Example.—Let the circumference be 91 :—

```
  91
   7
 ----
22)637(29   Diameter.
   44
 ----
   197
```

The trouble of this slight calculation may be saved by reference to the following table. Opposite to any given circumference in inches is the corresponding diameter.

In a line with 91, for example, is 29 diameter, as above computed.

This table is extensive enough to meet the case of all dimensions occurring in ordinary practice. For larger circumferences the rule of multiplying by 7 and dividing by 22 must be employed, or proportional parts may be taken from the table. Thus, for a circumference measuring 245 inches, we have from the table opposite to 20 inches the diameter 6·4, which multiplied by 10 gives the diameter for 200 inches, or 64 inches. Add 14·3, opposite to circumference 45, and the total, or 78·0, represents the diameter proper to the given circumference 245.

TABLE I.

Circumferences and Corresponding Diameters.

Circumference.	Diameter.	Circumference.	Diameter.	Circumference.	Diameter.	Circumference.	Diameter.
10	3·2	36	11·5	62	19·7	88	28·0
11	3·5	37	11·8	63	20·1	89	28·3
12	3·8	38	12·1	64	20·4	90	28·6
13	4·1	39	12·4	65	20·7	91	29·0
14	4·5	40	12·7	66	21·0	92	29·3
15	4·8	41	13·1	67	21·3	93	29·6
16	5·1	42	13·4	68	21·6	94	29·9
17	5·4	43	13·7	69	21·9	95	30·2
18	5·7	44	14·0	70	22·3	96	30·6
19	6·0	45	14·3	71	22·6	97	30·9
20	6·4	46	14·6	72	22·9	98	31·2
21	6·7	47	15·0	73	23·2	99	31·5
22	7·0	48	15·3	74	23·6	100	31·8
23	7·3	49	15·6	75	23·9	101	32·1

CIRCUMFERENCES AND CORRESPONDING DIAMETERS.
(Continued).

Circumference.	Diameter.	Circumference.	Diameter.	Circumference.	Diameter.	Circumference.	Diameter.
24	7·6	50	15·9	76	24·2	102	32·5
25	8 0	51	16·2	77	24 5	103	32·8
26	8·3	52	16·6	78	24·8	104	33·1
27	8·6	53	16·9	79	25·1	105	33·4
28	8·9	54	17·2	80	25 5	106	33·7
29	9 2	55	17·5	81	25 8	107	34·1
30	9·5	56	17·8	82	26·1	108	34·4
31	9·9	57	18·1	83	26·4	109	34·7
32	10·2	58	18·5	84	26·7	110	35·0
33	10·5	59	18·8	85	27·0	111	35·3
34	10·8	60	19·1	86	27·4	112	35·6
35	11·1	61	19·4	87	27·7	113	36 0
114	36·3	129	41·1	143	45·5	157	50·0
115	36·6	130	41·4	144	45·8	158	50·3
116	36·9	131	41·7	145	46·2	159	50·6
117	37·2	132	42·0	146	46·5	160	50 9
118	37·6	133	42·3	147	46·8	161	51·2
119	37·9	134	42·7	148	47·1	162	51·6
120	38·2	135	43·0	149	47·4	163	51·9
121	38·5	136	43·3	150	47·7	164	52·2
122	38·8	137	43·6	151	48·1	165	52·5
123	39·2	138	43·9	152	48·4	166	52 8
124	39·5	139	44·2	153	48·7	167	53·2
125	39·8	140	44·6	154	49·0	168	53·5
126	40·1	141	44·9	155	49·4	169	53·8
127	40·4	142	45·2	156	49·7	170	54·1
128	40·7						

It is important to remember that in calculating the diameter from the circumference, when measured round

the outside of any vessel, a deduction of *double* the average thickness of the wood must be made from the diameter first obtained. If 29 be the diameter corresponding to the external circumference 91, as above, then, supposing the thickness of the wood one inch, the *inside* diameter should be written down as 89 inches, for it will be evident that were the internal diameter measured directly it would be shorter by 2 inches (an inch at each end) than the result arrived at by calculation from the outside circumference.

As an additional check on the correctness of the diameter obtained by measurement of the upper or under surface of a cylinder, it is desirable to make one or two other measurements round or through the body of the vessel at equal distances apart, and take the average of these as the true diameter. The more the shape of the vessel appears to deviate at any point from the form of a perfect cylinder—that is, a vessel precisely the same width all the way through—the more numerous should be the measurements for determination of an average diameter.

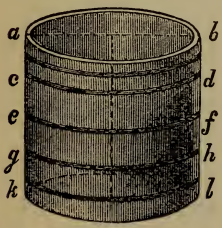


Fig. 3.

Thus, in the cylindrical vessel represented in the margin, diameters should be measured not only across the top and bottom, as at *a b* and *k l*, but also *c d*, *e f*, and *g h*, and the average of all these taken. In this manner, any slight irregularities in the width at different points are compensated.

Having obtained the average diameter, the next step

is to find the area of the bottom surface of the vessel from this dimension. To perform the necessary calculation without the aid of tables would be rather laborious in most instances; first, the diameter must be *squared*, (multiplied by itself), and then the product divided by the fixed circular divisor for gallons (353). A Table has been compiled by which the finding of any required area in gallons is rendered very simple and easy. An extract from the standard table used by Government officers is here appended, which will be sufficient for all the ordinary needs of persons in the wine and spirit trade.

TABLE II.

AREAS OF CIRCLES IN IMPERIAL GALLONS.

Diameters in inches.	0	1	2	3	4	5	6	7	8	9
1	0·28	0·34	0·41	0·48	0·56	0·64	0·73	0·82	0·92	1·02
2	1·13	1·25	1·37	1·50	1·63	1·77	1·91	2·06	2·22	2·38
3	2·55	2·72	2·90	3·08	3·27	3·47	3·67	3·88	4·09	4·31
4	4·53	4·76	5·00	5·24	5·48	5·74	5·99	6·26	6·53	6·80
5	7·08	7·37	7·66	7·96	8·26	8·57	8·88	9·20	9·53	9·86
6	10·20	10·54	10·89	11·25	11·60	11·97	12·34	12·72	13·10	13·49
7	13·88	14·28	14·68	15·09	15·51	15·93	16·36	16·79	17·23	17·68
8	18·13	18·58	19·05	19·51	19·99	20·47	20·95	21·44	21·94	22·44
9	22·94	23·46	23·97	24·50	25·03	25·56	26·10	26·65	27·20	27·76

To illustrate the method of using this Table, let the diameter be 52·8 inches. Required the area in gallons.

In a line with 5, column of diameters, and under the heading 2, is 7·66. For the additional tenths, deduct

7·66 from the next area (that for diameter 53), viz. : 7·96, and multiply the difference by 8 tenths, giving 0·24. ; add this to 7·66, and the result is 7·90, the area corresponding to diameter 52·8.

As a second example of the mode of using the Table, let the diameter 47·3 be given, to find the area.

Opposite to 4 and under 7, we have 6·26 area. For the additional tenths, multiply the difference between 6·26 and 6·53, the next area by ·3, and add result to 6·26. 0·27 multiplied by 0·3 gives 0·08; 6·26 added to 0·08 gives 6·34 as the area required.

These and similar small calculations are performed, after a little practice, with great rapidity.

It should be explained that by the word *area* in the sense here intended, is really meant the *content or capacity in gallons at one inch deep.* As multiplication by 1 does not alter a number, we are thus enabled to regard that which is properly the extent of a surface in square inches, as an expression for the content of a cylindrical vessel having the same surface, at one inch of its depth.

Having calculated the area as above, all that remains to be done in order to find the total contents of the cylinder is to multiply this area by the depth.

If the last area, 6·34 be taken, and the depth of the vessel be supposed 71 inches, then the total content will be,

```
  6·34
    71
  ----
   634
 4438
 -----
450·14        450 gallons.
```

At any proportionate part of this total depth the content is found by multiplying the area by such partial depth. Thus let the given depth be 26·2.

```
  6·34
  26·2
 ------
  1268
 3804
1268
 ------
166·108      or 166 gallons.
```

Oval-shaped (elliptical) vessels.—The finding of the content of circular vessels as just explained, is a very simple operation. But when we have to deal with vessels of oval shape, the task is not quite so easy, although properly speaking there is no real difficulty or abstruseness in the matter. All that is required to ensure a correct result is the exercise of care in drawing the two diameters of the surface, called the *transverse* and *conjugate* diameters, there being no one average dimensions, as in the case of the diameter of a circle, from which the area may be computed at one operation.

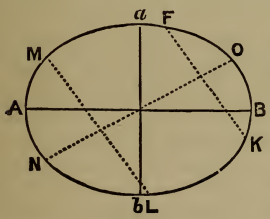


Fig. 4.

Fig 4, may be taken to represent the under or upper surface of an oval vessel. The first step is to determine the true centre of such a figure. *

Draw any two lines parallel to each other, as M L, F K, at any convenient distance apart across the oval. Find the

* Those who may be satisfied with a tolerable approach to

exact middle point of each of these lines, and through these points draw N O, the centre of the line so drawn is the centre of the oval, through which draw the lines A B and *a b*, perpendicular to each other. A B will be the *transverse* or longer diameter, and *a b* the *conjugate*, a shorter diameter of the oval.

A chalked string, such as carpenters use, held tightly at the required points, then raised and allowed to strike the surface smartly once or twice, is the best practical way of marking the lines.

If the bottom of the vessel is not a true oval or ellipse, a correct result cannot of course be obtained by gauging it according to the method proper to such figures. But unless the amount of deviation from the elliptical shape be considerable, a fact which will be at once apparent to the eye, no great error will be introduced by treating the surface as that of an ellipse.† More

correctness, and do not care to take the trouble of finding the exact centre of the ellipse in the manner indicated, can, no doubt, judge very nearly with the eye where the diameters, A B, and *a b*, should be shown so as to pass through the middle of the figure.

† Any person wishing to ascertain with precision whether the surface of an oval vessel corresponds with that of a true ellipse, may readily apply the following test:—Having drawn the lines which should coincide with the transverse and conjugate diameters, where the figure is strictly elliptical, let any other two similar lines be drawn through a point where these two diameters intersect. Then if the surface be that of a true ellipse, the product obtained by multiplying together the total of the lengths of the longest diameters by the difference between them will exactly equal the product of the sum and difference of the two shortest.

exact methods of gauging are not within the scope of this short treatise.

It will be best in all cases to measure the diameters both of the top and bottom surfaces when practicable, and take the average of the results.

Having found the two diameters if in the manner just described, we apply the following rule for ascertaining the area in gallons.

RULE.—From table 2 take out the area answering to each of the diameters, and add these numbers together. Then subtracting the shorter diameter from the longer, take out the area corresponding to the difference, and deduct it from the first area. The half of the final result gives the area of the surface in gallons.

Example:—

Let the longer diameter of an oval be 48 inches, and the shorter 36. Required the area.

Table 2.—Area opposite to	48 =	6·53
" "	36 =	3·67
Sum of these two	=	10·20
" Area opposite to (difference of diameters)	12 =	0·41
		2)9·79
		4·89

Area of oval, 4·89 gallons.

The rule for the calculation, without a Table, is—

Multiply together the two diameters, and divide by 353. Thus—

```
      48
      36
     ----
     288
    144
    ----
353)1728(4·89
    1412
    ----
     3160
     2824
     -----
      3360
      3177
```

It may be useful to remember when tables are not at hand, that the rule for the area of *circular* surfaces is—Multiply the diameter by itself, and divide by 353; for the area of *oval or elliptical* surfaces—multiply the two diameters together and divide by 353.

In order to determine the content of an elliptical vessel, we have only to multiply the area of the surface by the total or partial depth, as the case may be. After the illustrations already given as respects circular vessels, an example cannot here be needed.

Cask and Vat gauging.—To ascertain the content of a cask with perfect exactness by any system of gauging

applicable to all the various forms occurring in practice, is a difficult task, one indeed that requires special skill and training as well as special instruments to execute. Casks differ so much in shape according to the country they come from or the degree of care bestowed by the cooper at home or abroad in conforming to a model, that no *general* method for finding the true content by gauging on scientific principles can be laid down. Allowances have to be made for deviations from the standard shape, as estimated by the eye or by measurements at certain points, and the making of these allowances so as to ensure an accurate result in every case is quite an art of itself.

At the present day it is the universal custom with gaugers to treat all casks which approach tolerably to the usual pattern, as having the form of what is called the *middle frustum* (*or segment*) *of a spheroid*, and to make such allowances on the length of the cask as may be judged necessary to compensate for the deviation of the shape from that particular standard. The errors committed in adopting this method are not very great in the hands of an experienced person; but there is almost always a liability to some degree of error, though the amount may be of no moment.

A perfectly certain process, when it can be conveniently carried out, is to measure with water, using a standard gallon and at the end smaller measures. Another plan, giving equally correct results, is to ascertain in a large pair of scales the tare or weight of the cask when empty;

fill it with water or some other liquid, and then weigh it again; the tare deducted from the gross weight gives the weight of the liquid present, and this divided by the weight of a single gallon of the liquid furnishes the true content or capacity of the cask, without regard to its particular shape. As water when moderately pure weighs 10 lbs. per gallon, the work of division where water is used is very simple; but where the cask to be dealt with is wholly or partially full at the time at which it is sought to ascertain the content, and where suitable scales and weights cannot readily be procured, this system of weighing, however accurate, hardly admits of being employed.

As a rule, the wine or spirit dealer or retailer finds himself obliged to arrive at the contents of his casks, large and small, by adopting some plan of rough measurement, and that chiefly from the outside.

We here proceed to show how such measurements may be most easily effected without special instruments, and with the least amount of practical error.

As the system of allowances on the length cannot be applied except by skilled gaugers, it becomes necessary for other persons to adopt some plan which shall serve as an equivalent, and this expedient is furnished by the taking of a diameter midway between the bung and the head diameters of each cask. With the aid of such a dimension all the irregularities that may present themselves in the shape of a cask are provided for and a correct result ensured. The only difficulty about a middle

diameter is the fact that in a vessel usually closed at both ends like a cask, access cannot be had to the interior so as to obtain by direct measurement the dimension at the right points. There are two ways, however, of arriving very nearly at the true distance. One is to pass a graduated tape round the cask, just half way between the bung and the head, find the corresponding diameter from Table 1, and deduct the average thickness of the staves. Another plan, giving perhaps even more exact results, is that shown in the following diagram and description, which exhibit the most simple instruments and devices that can be used for ascertaining the necessary dimensions of a cask without the aid of callipers and headrods.*

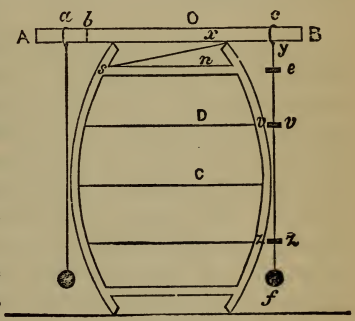


Fig. 5.

Procure a piece of wood (straight lath), such as A B (figure 5), an inch thick, and about 6 feet long; near one end, as at *a*, cut a notch, and at two inches from this, as at *b*, make a mark; also at a point somewhere about the middle of the rod A B put the figure 0. Then divide the distance from *b* to the end B into inches and tenths. Provide also two pieces of string, with loops on one end of each, and plummets of lead or other heavy weights

* The principle of this method of gauging casks was first suggested by Mr. Kentish.

at the other end, as shown in the diagram, and suspend one of the strings to the rod A B at the place where it is notched. The corks or pieces of rubber should be so attached to the string as to slip with some friction up and down and remain fixed at any required point.

Before tying the loop on the bar at the top, fasten on one of the strings three small bits of cork, *e*, *v*, *z*, or still better, discs of India-rubber, about one eighth inch thick and half an inch across.

Then in order to take the dimensions of a cask in a standing position, for all casks may of course be so placed when required.

1°.—Lay the rod A B over the middle of the head, so that the plumb line hanging from the notch at *a* may touch the *bulge* (the most projecting point at the middle) of the cask. Then fasten the other plummet line round the rod at B at such a point as will make it also touch the bulge on that side of the cask. Let this point be that marked *c* in the diagram. The number standing on the divided rod A B at *c* will represent the internal *bung* diameter of the cask, or the line *C;* the distance of two inches between the notch and the point *b* is an allowance for the supposed double thickness of the staves; if the staves should on examination * prove to

* Boring in one or two places with a gimlet and measuring the holes, is the only certain method. The holes may afterwards be securely stopped with a spile.

be more or less than one inch thick, the distance of the point *b* from the notch should be regulated accordingly.

2°.—With a measuring rod divided into inches and tenths, or a well graduated tape, take the distance from *y* (at the *under* side of the rod A B) to the ground, also the distance from O, the *upper* side of the rod to *n*, the head of the cask. Then the distance *y f*, less twice *o n* will represent the internal length of the vessel, the thickness of the rod A B being assumed equal to the thickness of the head, which is usually 1 inch; if the staves of the head should be thicker or thinner than one inch an allowance can easily be made in the measurement of the length of the cask.

3°.—To ascertain the intermediate (middle) diameter D, push the top cork on the string *c z* up to *e*, so that the distance *y e* shall be equal to the space from *o* to *n*. The length of the cask having just been determined, push the second cork to *v*, so that the distance *e v* shall represent one quarter of the length of the cask. If the shape of the cask appear irregular, the third cork, *z*, should be adjusted in a similar manner so as to stand at one quarter of the length from the bottom. Now, add together the distances *v v* and *z z*, and subtract their sum from the bung diameter, as previously ascertained; the remainder will be the length of the intermediate diameter D. When the top and the bottom of the cask seem of the same dimensions, only one cork, that at *v*, need be moved, twice the distance, *v v* being deducted from the bung in order to arrive at the intermediate diameter.

4°.—The slanting line shown in the diagram as measured from S, the inside of the *chimb* to *x*, the intermost sloped edge of the opposite stave will give the internal head diameter; or the same result may be obtained by measuring in a straight line from *e* to the outside of the cask, doubling this distance, and then subtracting it from the bung diameter.

Although in the description and the necessary explanations these various measurements and adjustments may seem rather tedious and complicated, it would not be found in practice at all difficult or laborious to apply them after one or two trials; and there can be no doubt that great accuracy is ensured by adopting such a method.

A great advantage of it is that all the dimensions are taken *externally*, so that there is no necessity to remove one of the heads of the cask in order to measure internally, a thing which would often be inconvenient and troublesome, indeed sometimes impossible.

For those who may prefer a simpler and rougher way of proceeding, and may not care for great accuracy, there is the plan of measuring with a graduated tape round the cask at all the necessary points for the head, the bung, and the intermediate diameters, referring to Table 1, for the diameters corresponding to the outside circumferences so determined, and then making a deduction from these of *twice* the thickness of the staves (see page 330). To obtain the *length*, measurement must be made with an upright rod, or a graduated tape slightly stretched, in the manner first described. Many standing casks have a small circular hole in the head which will admit of the internal

length being ascertained by means of a graduated rod with great accuracy.

When the measurements are taken with a tape round the cask, the measurement for the head diameter should be as close as possible under the place at which the head rests, a corresponding trial being made at the bottom, and the average of the two results used should there be much difference between the circumferences determined. The measurement for the bung diameter can only be at one point, namely, round the middle of the cask; that for the intermediate diameter should be at a distance as nearly as can be judged midway between the bung and the head, a similar measurement being made below and the average taken.

We will now suppose the requisite dimensions obtained by either of the two methods described, and proceed to show how the content of the cask may be found without any labour of calculation by means of the Table of areas, page 331,

Let the length be 40 inches.
Bung diameter 32 „
Head diameter 24 „
Middle diameter 30·2 „

Rule.—From Table 2, take out the area corresponding to the middle diameter, and multiply this by 4. Then take out the areas answering respectively to the head and bung diameters, and add all the results together. Multiply by one sixth of the length, and you have the content of the cask in gallons.

		Table of Areas.
Thus, middle diam.	30·2 ...	2·58
		4
		10·32
„ Head	„ 24 ...	1·63
„ Bung	„ 32 ...	2·90
		14·85
		40
Multiply by length	40	6)594·0
and divide by	6	99·4

Answer 99 gallons.

The *numerical* rule in these cases is—add together the square of the bung, the square of the head, and the square of twice the middle diameters in inches; multiply the total by one sixth of the length, and divide by 353—

Twice middle diameter squared =	3648
Head „ „ =	576
Bung „ „ =	1024
	5248
	40
	6)209920
	353) 34987(99
	3177
	3217
	3177

most persons will prefer the saving of labour afforded by the Table of Areas; but a calculation with the pen is useful as a check on the correctness of the result first given.

As already remarked, the finding of a middle diameter between a bung and the head supplies an almost infallible method of determining the true content of any cask, however irregular its shape. The slight additional trouble involved in the measurement of this diameter should therefore never be regarded. In casks which conform exactly to the *ideal* standard of the middle frustum of a spheroid (see page 337), the middle diameter may be calculated from the other dimensions, by adding the square of the head to three times the square of the bung diameter; one fourth of the amount will be square of the middle diameter required. But as in practice, casks vary indefinitely from this standard shape, it is obvious that a merely calculated middle diameter is of no utility.

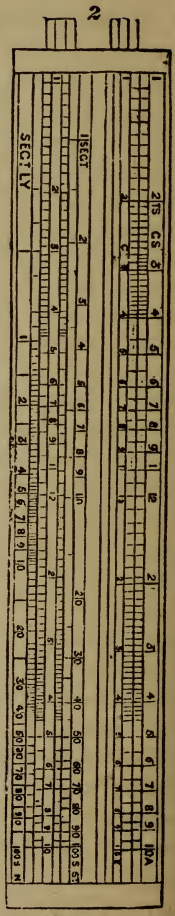
However large a cask or vat may be, its capacity can be determined with very little practical error by carefully following in all details one of the methods described.

Ullaging.—In a vessel having the form of an ordinary cask where the diameters differ in length at every point between the bottom and the middle sections, it is not possible to find the quantity of liquid present at any given part of the length or bung diameter by simply multiplying the area at one inch by the given depth of liquid, as in the case of a true cylinder or an ellipse. A special mode of proceeding is here necessary; tables founded on experiments with a great number of casks of the average shape have had to be constructed, and from the data so supplied, lines laid down on a slide rule, so that the ascertaining of the quantity of liquid in a cask of known content, and bung diameter or length, might be rendered a rapid and easy task to practical men.

After this short explanation of the general principles of the system adopted, we proceed to show by examples how the ullage sliding rule, such as that figured in the margin is to be used, in the case either of standing or lying casks for finding the quantity corresponding to any given fraction of the length or the bung diameter.

The word *ullage*, whatever its derivation, means always, part of the full content, whether that be the quantity of liquor present in the cask at any given depth, or the unoccupied space above the surface of the liquor. It is usual to call the former the "wet ullage," and the latter the "dry ullage."

Disregarding the whole of that side of the ullaging rule marked "Under Proof," and "Over Proof," which has nothing to do with the present subject, there will be seen on the lower part of the other side of the rule the characters "Segt. St.," and "Segt. Ly." These characters stand for the words respectively, "Segment Standing," and "Segment Lying." The former is used for finding the ullage quantity in casks in a standing position; the latter is used for the same purpose in the case of lying casks (resting on their bulge).


SEGT. LY
SEGT.
2
1
2
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In order properly to apply the lines or segments, and the line graduated on the slider which works in connection with them, all that is necessary is to learn how to read off or estimate the value of the figures and divisions laid down on the rule. With a little attention this art can soon be acquired.

The same principle of division is employed in marking each of the lines. Between any two of the points denoted by figures, the space is divided into either ten or five parts. It will be seen at once that these parts are not equal in the various portions of the line; between certain of the figures, especially those towards the left hand as the rule is held before one, the spaces are much wider than at other points. This peculiarity results from the lines being laid down according to *logarithmic*, not according to ordinary arithmetical progression. It is only by use of two logarithmic series working in connection with each other, that multiplication, division, and other similar operations can be performed mechanically. But it is unnecessary for practical men to concern themselves with the *reasons* of the mode of graduation adopted. It is sufficient for them to know that each line is to be read as follows:—

Taking for example the line marked "Segt. St." whatever value may be given by the user of the rule to the figure 1 at the left hand end of this line, whether he call it simply 1, as marked, or 10, 100, 1000, &c., he must give a corresponding value to the other figures on the lines; that is, if he regards 1 as standing for 10, then he must regard 2 as standing for 20; 3 as standing for 30,

and so on; similarly, if 1 be called 100, then 2 will be 200, 3 will be 300 and so on. All this is simple enough, and it is equally easy to read on the same principle the value of the divisions between the figures. The space between 1 and 2 for instance, as marked on the rule, is divided into ten parts, and the same mode of division is used as far as the figure 5. Consequently, the divisions from 1 to 2, from 2 to 3, and up to 5 are to be read as—

1, 1·1, 1·2, 1·3, 1·4 2
2, 2·1, 2·2, 2·3, 2·4 3
&c., &c.

From 5 to 10 the intervals are graduated into only 5 divisions each. Therefore each of these divisions must be regarded as denoting 2 tenths. Thus—

2, 2·2, 2·4, 2·6, 2·8 3
3, 3·2, 3·4, 3·6, 3·8 4
&c., &c.

The remainder of the line towards the right is graduated on one or other of these systems, as will be seen on inspection.

Now, if 1 be called 10, the point 1·2 must be called 12, the point 1·3 must be called 13, and so on up to 20.

But further explanation on this point cannot be necessary.

As respects the slider E used in connection with the segment lines, a similar system of graduation is employed, although the intervals between the numbered divisions are marked differently from the corresponding parts of Segt. St.

On the line Segt. Ly., at the bottom of the rule, the

only point that may require notice is the proper way of interpreting the space which precedes the figure 1 on the left. Going backwards from 1, the first mark must be called 9 tenths, the second 8 tenths, and so on up to 3 tenths, beyond which there is no graduation. Of course, if 1 stood for 10, then 9 tenths would stand for 9, &c.

Where, on any of the three lines, one of the divisions is carried up a little higher than the others, that is to be viewed as denoting the half of the space between two successive figures. This is done to assist the eye in reading the rule.

What the lines of segments really denote, at any point, is the ullage quantity in a cask *of* 100 *gallons content* corresponding to a given fraction of the bung diameter, or the length, according as the cask is lying or standing. The given fraction of the bung diameter, or the length, is called the "wet inches," or if the vacuity above the surface of the liquor is intended, the "dry inches."

When a lying cask is dipped to the bottom perpendicularly through the bung-hole with a graduated rod,* a mark is made on the rod by the liquid present at the point of contact with the surface, and the height to which the rod is thus wetted is called the "wet inches," as above. Similarly, the distance, if any, from this point to

* A dipping rod or a "spile rod" (the latter either in one piece or screwing together in several lengths) is the proper instrument to use for measuring the bung diameter, or length, and the wet inches of any ordinary cask. W. R. LOFTUS supplies either of these, of the best make, at moderate prices. *See* advertisements at end.

the extent of the bung diameter—the vacuity, in short—is the "dry inches." It must be evident that by adding together the wet and the dry inches we should always obtain the length of the bung diameter, and similarly as regards a standing cask.

The ullage given by the segment lines for a cask of 100 gallons content has now to be applied to casks of various capacities by a simple calculation in proportion, which may also be effected by the rule. If 44, for instance, should be given on the line Segt. St. as the ullage corresponding to the length 45, and wet inches 20, this means that in a cask of 100 gallons content whose length is 45 inches, and when the wet inches are 20, there are 44 gallons of liquid present. Now, should the same length and wet inches be given for a cask of 85 gallons content, we should say by the rule of three,

	Content		Content		Ullage		Ullage
As	100	:	85	: :	44	:	37·4

Multiplying 44 by 85 and dividing by 100. But the necessity of calculating this with the pen is avoided for us by a very simple operation with the sliding rod, as will now be explained.

On the upper part of the same side of the rule with the segment lines is a line marked A. This line, in conjunction with the upper slider marked B, enables us to perform rule of three sums by a mere touch with the hand. The mode of graduation of these two lines is similar to that employed on the slider E at bottom. The line marked D has no reference to the finding of ullages, and need not be here explained.

To use the lines A and B in connection with the seg-

ment lines on the slider B, set the segment given by Segt. St. or Segt. Ly. to 10 on A: under the full content on A will appear the ullage on the slider B. Thus, for segment 44 and full content 85, as in the present example, we set 44 on B to 10 on A: under 85 on A stands 37·4 on B, the same result as that obtained by calculation with the pen.

The segment 44 in this case must really be regarded as 0·44, that is as 44 hundredths of the content of the *standard* cask; and multiplying 85, the full content by this decimal, amounts to the same thing as first multiplying by the whole number 85 and then dividing by 100, as required by the rule of three. Every other segment must be viewed in the same way, namely, as so many hundredths, or with small ullages as so many thousandths of the standard content 100.

The general rule for ullaging is accordingly—

Rule for Ullaging.—Set the length or the bung diameter, as the case may be, on the bottom slider, E, to 100 on Segt. St., if the cask be standing, or to 100 on Segt. Ly., if the cask be lying; then opposite the wet inches, or the vacuity, on the slider E read off the segment on Segt. St. or Segt. Ly.

On the upper slider, B, set the segment so found to 10 on A, and under the full content on A will be seen the ullage on B.

Example 1, standing cask.—Given length 48, wet inches 8·7, and full content 96 gallons. Required the wet and the dry ullage.

·16	100	Segt. St.
8·7	48	E

Then

96	10	A
15·4	·16	B

Answer, 15·4 gallons wet ullage. For the vacuity, or dry ullage, the easiest way is to deduct 15·4 from full content, 96—Dry ullage 80·6. But it is always better to find the dry ullage directly, by deducting the wet inches from the length, and proceeding as above on the rule. The correctness of the results thus obtained may then be proved by adding together the two ullages, which should be, as nearly as possible, the full content of the cask.

Example 2—lying cask. Bung diameter 32·6; wet inches 30·4; content 128 gallons.

Set 32·6 on E to 100 on Segt. Ly., under 30·4 on E is ·975 on Segt. Ly. Set ·975 on B to 10 on A; under 128 on A is 125·5 on B.

For the dry ullage corresponding to this, deduct 30·4 from 32·6; remainder 2·2.

Set the bung 32·6 on E to 100 on Segt. Ly.; under 2·2 at the left hand end of the slider (the number near 32·6 would be 22) appears the segment ·19, which, as above explained, must here be regarded as ·019.

Setting 19 on B to 10 on A, we have, under 128 on A, the dry ullage 2·4 on B.

To prove the correctness of this result, add together 125·5, the wet, and 2·4, the dry, ullages, and we have 127·9, or within one-tenth of the full content of the cask.

For small ullages, the sliding rule here described is not

divided with sufficient openness to give accurate results, particularly in the case of lying casks. A larger rule, graduated with wide divisions for lying casks, should be used when there are only trifling quantities of liquor in such casks. But even with this special rule the ullages given can hardly be depended upon, as the irregular shape of most casks affects the measurements taken near to the bung hole more than in other parts of the cask. Any person wishing to obtain the utmost practicable accuracy in the case of small ullages should procure the large ullaging rule sold by W. R. LOFTUS, the use of which almost explains itself. But it must be borne in mind that the rule in question is intended to deal with vacuities rather than with wet inches; so that the vacuity should in every instance be obtained by deducting the wet inches from the bung diameter, and then ascertaining with the rule how much the cask wants of being full; the quantity of liquor present can then be found by simple subtraction from the full content.

Inching and Tabulation of Casks or Vats.—Where large fixed standing vessels are used in trade, it is very convenient to have a table constructed showing for each cask what quantity of liquor corresponds to every inch and tenth of an inch of the depth. The mode of compiling such tables is obvious. Find by the slide rule the ullage of each successive inch of the length, and for tenths of an inch add so many tenths of the quantity in the next section of the cask. There is no method really shorter than this, and the labour of making a table for even inches is not very great; for the length being once set to 100 on Segt. St., all the segments corresponding to the successive inches of the length may be read off and noted

down in a moment or two without moving the slider. Then it is only necessary to multiply these segments one after another by the content of the cask—an operation easily performed on the slide rule, as above shown. In casks of regular or nearly regular shape the process of finding segments, &c., need not be continued beyond half the length, as the ullages given by the lower half will furnish all the data required for the tabulation of the upper section.

Example.—Suppose the length of a cask 56 inches, and the content 104 gallons.

Setting 56 on E to 100 on Segt. St. we have over 1, on the extreme left of the slider, the segment 0·017 ; over 2, the segment ·028, &c., &c. Having thus found the segments answering to each successive inch as far as the half of the length, we next set the content of the cask, 104 gallons, on B to 1 on the extreme left of A, at the top of the rule, and then read off on B the several ullages opposite to the segments on A. For tabulation purposes this is a more convenient process than the setting usually employed at the other end of the rule, when only a single ullage has to be ascertained.

Proceeding in this manner with the dimensions above given, we have :—

Depths in inches.	Segments.	Ullages.	Differences.
1	·018	1·8	
2	·023	2·9	1·1
3	·045	4·5	1·6
4	·058	6·0	1·5
5	·074	·77	1·7

&c., &c., &c.

A table may now be formed by writing down the quantity at every whole inch, and inserting tenths from the column of differences.

TABLE OF STANDING CASK. No.....

Length 56; *Content* 104.

Inches.	Ullage quantity.
1	1·8
1·1	1·9
1·2	2·0
1·3	2·2
1·4	2·3
1·5	2·4
1·6	2·6
&c., &c.	
2·0	2·9
&c., &c.	

Or it may be thought sufficient to insert only whole inches, and place opposite to each the quantity to be added for every tenth of an inch additional, up to the next whole inch. Thus:—

Inches.	Ullage quantity.	Tenths.
1	1·8	·11
2	2·9	·16
3	4·5	·15
4	6·0	·17
&c., &c.		

Example—

Given depth 3·8 inches; 3 inches gives 4·5 galls.; 8 tenths multiplied by 1·5 give 1·2, which added to 4·5 give 5·7 for the quantity corresponding to the depth 3·8 inches.

Lying casks cannot be tabulated in this way with much accuracy; the wet inches and tenths must be found separately by the slide rule for every portion of the depth (bung diameter). But it is seldom required to tabulate lying casks.

Diagonal rod.—It remains to give a brief description of this useful instrument, which indicates on mere inspection the content of any regularly formed cask with tolerable exactness. Practice and judgment are, however, needed, to ensure good results.

The principle of the diagonal rod is that ordinary casks having nearly the same figure, their contents are in direct proportion to the *cubes* of their like dimensions. Now, the most convenient dimension to ascertain is the length of the slanting line between the centre of the bung-hole, and the inner edge of the bottom of the opposite head, as shown in the diagram, This is called the diagonal line, and the rod specially used for measuring it and showing at the same time on inspection the content of the cask is called the diagonal rod. It is constructed as follows:—

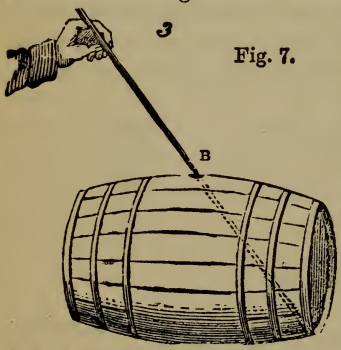

Fig. 7.

A cask is selected, having the diagonal of 48 inches and full content 250 gallons. At the top of the rod is placed 250 galls. Then the proper position of

the other numbers (contents) is found and marked according to the proportion above mentioned. Suppose, for instance, a cask having the content of 144 galls., required the diagonal in inches :—

Content of standard cask.		Content of given cask.			Cube of standard diagonal.		Cube of diagonal required.
250	:	144	:	:	110592	:	637000

And the cube root of 637000 is very nearly 40. Therefore 144 content is marked on the rod opposite to 40 inches, and in a similar way all the remaining diagonals are found.

In using this rod, take care to insert the edge of the bevelled end firmly at the bottom of the joining of the head, and to read off the content exactly at the centre of the *under* surface of the bung-hole. A very slight inattention in this respect will show a large difference in the content read off. To ensure a right result it is well to insert a thin slip of wood at the bung-hole, and to hold it pressed against the under surface of the cask across the opening, while, with the other hand the diagonal rod is introduced. The point on the rod should then be carefully observed at which the edge of the slip of wood touches the rod, and the nearest number of gallons taken as the content. Two trials should also be made with the rod, one at each head of the cask, and the average of the two results taken; unless the cask be tolerably regular, the diagonal rod cannot be relied upon as giving even an approximately correct content.

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